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ABSTRACT

Using a total of 88 students from one- and two-year child career and development programs in the Wisconsin Vocational Technical and Adult Education System, a study was conducted to determine (1) to what extent the students were field independent (i.e., learner's cognitive style characterized as analytic; longer attention span, greater reflectivity) or field dependent (i.e., learner's cognitive style characterized by short attention span and distractedness; less competitive and achievement oriented), (2) to what extent teachers exert direct or indirect influence in the instruction of these students, (3) students preference for direct or indirect communication from the teacher and structured or less structural learning activities, and (4) the relationship between learning style and instructional preference. Following student and teacher observations, preference surveys and hidden figure tests were administered. Findings were that the students were predominantly field dependent and that the teachers used direct influence as a primary mode of interaction. Students showed a slight preference for indirect instruction, but did not show general preferences for either structured or less structured learning activities. Course satisfaction was high, indicating that students' expectations matched the instruction planned for them. It was concluded that the teacher's relationship with the student and the instructional approach are intertwined and may have an important effect on learning. (BL)

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FINAL REPORT
Project No. 19-008-151-227

Learning Styles of Vocational Child Care and Development Students in Wisconsin

by

Jeanette Daines

Center for Vocational, Technical and Adult Education
University of Wisconsin-Stout
Menomonie, Wisconsin

August, 1977

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CHAPTER I

PROBLEM AND RATIONALE

Summary

The purpose of the study was to describe the learning styles and instructional preferences of students, and the instructional styles of teachers in selected child care and development programs of the Wisconsin Vocational, Technical and Adult Education System during the Spring Semester, 1977.

The Hidden Figures Test (HFT) was used to measure the field independence-dependence of the students, and a researcher-designed self-report Preference Survey (PS) was used to ascertain preferences for direct/indirect interaction and structured/less structured activities. Interaction analysis based on systematic observation was used to identify the relative directness/indirectness of teacher influence and the degree of structure in the instructional context.

Data from the HFT and PS were analyzed by descriptive statistics, t-tests and the Pearson product moment correlation technique, while the instructional context was analyzed using a chi square technique developed for interaction analysis.

The majority of the students were field dependent, and the teachers used a predominance of direct influence in a relatively structured context. Indirect interaction was slightly more preferred than direct, but general preferences for structured or less structured activities did not emerge. There were no relationships between HFT score or group and total score of the PS scales; a significant relationship existed for one item only.

Introduction

Throughout the recent history of education, the major responsibility for learning traditionally has been borne by the learner. Many students have assumed this responsibility successfully, but for others the learning experience has been associated with failure. Students who have been underachievers frequently have been considered to be unmotivated, lacking in ability, or handicapped by conditions beyond the control of the teacher. Often these students have become casualties of the educational system. Unable to compete successfully in the classroom environment, they have been relegated to roles in society which do not provide opportunities for growth and which potentially lead to further discouragement. Society has overlooked the inherent capabilities of individuals who have not performed according to its expectations.

A new awareness of the importance of each individual emerged with the onset of the space age. At that time it was believed that American technological advances lagged significantly behind those of other great powers. Concerned, the federal government began to encourage research and development efforts in education as a means of shortening the gap. As different components of the teaching-learning process were critically assessed, responsibility for learning evolved to include the teacher as well as the learner. The maximum development of each individual was viewed as essential to the building of the high quality human resource bank needed for the advancement of contemporary goals. Consequently, the teacher's ability to meet the needs of students who had a wide range of differences became an issue in determining the effectiveness of the educational system.

The effectiveness of teaching-learning has been especially scrutinized during the last decade, when new urgencies have compounded the stress for educators. Society has been faced with the paradoxical need or desire to maximize human resource development while conserving physical and financial resources. The impact of this situation on educational systems has been far-reaching. The public has demanded higher levels of accountability and productivity from educators, with learning outcomes measured by the

success of the students. Educators are expected to provide a broad outreach of services to individuals, as well as build quality programs that encourage optimum development and meet societal goals.

Attempts have been made to accommodate the new priorities using current resources. However, funding for education has not kept pace with inflationary pressures and the growing responsibilities placed upon the system. Nevertheless, educators have responded by attempting to maximize staff and monetary resources so that teaching and learning can become more efficient. Additional efforts are being made to identify other avenues that might increase the effectiveness of instruction. One of these possibilities, that of adapting instruction to the characteristics of the learner, is now receiving new emphasis as an objective of many programs.

One difficulty in successfully achieving this objective for a broad spectrum of learners is that little is known about the teaching-learning process. Various factors that affect learning have been isolated, but their combined effects can only be assumed. The actual processes whereby learning occurs within a specific context are relatively unknown, as are the ranges and nature of individual differences in these processes. Traditional methods of instruction may have a variety of consequences

which are as yet unidentified. Likewise, the quality of interaction between students and teachers with particular characteristics has not been studied adequately.

Wide variances could exist within any group of learners; thus, the degree to which a teacher recognizes individual differences and adjusts instruction to meet individual or group needs could directly affect learning. The appropriateness of instruction, including the subject matter, level and method of presentation, may be revealed in the responses of the students. For example, differences might be found between the effects of teaching designed for prospective kindergarten teachers enrolled in traditional academic programs at colleges and the effects of the same approach to teaching when directed toward child care students or workers participating in vocationally oriented or inservice training programs. In each of these situations, the purpose of instruction would be to develop the skills of persons who would be relating to young children. However, the processes by which prospective teachers in each program learn could differ, ultimately affecting the ways in which he/she presents information or structures learning environments for others. If the instruction received in any group is incongruent with student needs and approaches to learning, it is likely that the results will be less than optimal.

Therefore, it seems imperative that further investigation be made regarding the processes of learning and their relation to the manner and method of teaching. This need was recognized by Elliott (cited in Butler, 1970), and also by Mayer (1972) as they expressed concern for the lack of precise information on student-teacher interaction.

Statement of the Problem

In recent years, financial pressures and public demands for greater accountability have caused educators to search for ways to better utilize resources and improve instruction. One result of this concern is the awareness that the learning process is important in any situation, but that it may be particularly so when this interaction eventually will affect the development of young children. Provisions for quality care and education of this group have received new emphasis from public and private sectors. In particular, recognition of the importance of early development, changing role patterns, and a greater involvement of women in the work force have encouraged the establishment of day care and compensatory programs. Vocational technical institutes and universities have responded to these forces by preparing personnel for child care and development occupations. A considerable amount of money and effort has been expended for in-service and preservice training.

However, little is known of the learning styles of prospective child care workers, nor have specific instructional methods been identified that effectively promote student achievement and/or satisfaction. It is also unclear whether these individuals prefer direct or indirect instruction, or whether such preferences can be associated with a particular learning style. Consequently, it is difficult for teachers to adapt instruction to match individual characteristics of the students.

Purpose of the Study

The purpose of the study was to describe the learning styles and instructional preferences of students, and the instructional styles of teachers in selected child care and development programs of the Wisconsin Vocational Technical and Adult Education System during the Spring Semester, 1977.

Specifically, answers to the following questions were sought:

1. To what extent are the students field independent or field dependent in learning style?
2. To what extent do teachers exert direct or indirect influence in the instruction of these students?
3. Do students prefer direct or indirect communication from the teacher?

4. Do students prefer relatively structured or less structured learning activities?

5. Does a relationship exist between the learning style of the students and their instructional preferences?

Definition of Terms

The following terms are integral to this investigation, and they are used as defined:

1. Learning style refers to "information processing habits which represent the learner's typical mode of perceiving, thinking, problem solving and remembering" (Sperry, 1971, p. 3) as measured by the ability to overcome embeddedness factors on the Hidden Figures Test CF-1 (HFT) (Buros, 1972, p. 440).

2. Field independence (fi) refers to the learning style wherein perceptions are not strongly influenced by the surroundings, indicating relatively high ability to overcome embeddedness as measured by a score of 15-32 on the HFT.

3. Field dependence (fd) refers to the learning style wherein perceptions are strongly influenced by the surroundings, resulting in relatively low ability to overcome embeddedness as measured by a score of 0-14 on the HFT.

4. Instructional style refers to the manner in which the teacher typically uses direct and indirect influence (Flanders, 1964) to control the external learning situation.

5. Direct instruction refers to the percentage of interactions classified as predominately direct influence through analysis of the Flanders matrix (1964).

6. Indirect instruction refers to the percentage of interactions classified as predominately indirect influence through analysis of the Flanders matrix (1964).

7. Instructional preferences refer to students' responses on the Preference Survey (PS) which designate direct or indirect teaching techniques and structured or less structured activities as being important to their learning.

Hypotheses

It was hypothesized that students enrolled in child care and development programs would be predominantly field dependent in learning style as measured by their performance on the Hidden Figures Test, and that the teachers' instructional style would be predominantly direct as classified by the Flanders interaction analysis system. It was further hypothesized that a relationship exists between student learning style and preference for selected conditions of instruction.

The relationships specified in the research hypothesis were tested by failing to reject or rejecting the following null hypotheses:

Ho_1: There is no significant relationship between field independence-dependence and preference for direct or indirect instruction.

Ho_2: There is no significant relationship between field independence-dependence and preference for structured or less structured activities.

Scope and Limitations

The study utilized the HFT to identify fi-fd learning styles, and a self-report instrument (PS) designed by the researcher to reveal the instructional preferences of vocational child care and development students. No attempt was made to assess other learner characteristics such as general ability, verbal comprehension, etc., or to measure actual learning outcomes in any of the groups. Group activities were observed by the researcher and classified according to the ten categories of instruction specified by Flanders (1964) as components of direct or indirect instruction. Other elements of instruction such as rate, setting, conceptual development, etc., were not studied. In addition to the initial description of learning and instructional styles, analysis was made of the relationship between the students' HFT score and selected items on the PS in order to determine the role of direct and indirect influence and structured or unstructured activities as perceived by the students.

Since the population consisted of first and second-year students enrolled in Wisconsin VTAE diploma and associate degree programs for child care and development occupations and their teachers, any generalizations are limited to the degree that these individuals were typical of other participants in similar courses and settings. The study was conducted during the second semester of the 1976-77 academic year, thus the majority of students involved had already completed at least one semester successfully. Students whose learning styles were extremely incongruent with the existing instructional styles may have left the program prior to the study.

The study was limited to the extent that the HFT provides a valid measure of fi-fd, and that the Flanders system is a valid indicator of the components of direct or indirect instruction. Further limitations involved the reliability of the researcher in observing the interaction of the classes. The study was also limited to the degree that the self-report preference survey is an unbiased instrument which provides alternatives for the respondents, and to the degree that the students accurately portrayed their preferences.

Finally, the study was limited to the extent that appropriate statistical techniques were used to analyze the data, and that the findings were effectively interpreted and discussed.

Related Research

While learning is a phenomena that has been studied from many perspectives, only recently has attention been directed toward individual differences in modes of learning or teaching. Investigations have begun to document these differences, and to outline the parameters of several distinct styles. The following discussion attempts to (1) provide an orientation to the developmental foundations underlying an individual's style, (2) define the concepts of learning style and instructional style, and (3) review findings related to learning style, especially the investigations which have delineated the characteristics of the particular modes known as field independence-dependence (fi-fd) and their relation to instruction.

Principles

The learning of any individual is rooted in principles which emphasize that while predictable stages of growth occur, the rate of growth varies within and between individuals. Psychological and physiological systems, as well as their components, develop at different rates for both individuals and groups. In each of the systems, epigenesis occurs and progresses from being global or undifferentiated to greater refinement and differentiation.

The capability of the individual to integrate all functions increases as development evolves (Smart and Smart, 1972).

Piaget illustrated the consistency of the above principle in regard to cognitive development. However, he emphasized the concept of equilibration, or homeostatic interaction of the organism with the environment. The early years of a child's life are characterized as being a time of complex intellectual development. The quality of cognition becomes cumulatively enriched as the child enters and progresses through each of the fixed sequence of stages which Piaget has identified. Organization and adaptation mechanisms play vital roles in the child's constant efforts to equilibrate. Organization provides the structure to which the individual relates stimuli from the environment and consequently adapt to it (Beard, 1969).

The cognitive framework as conceptualized by Piaget describes the level of cognition at each stage, but it does not explain individual differences in organization or adaptation. A number of factors could account for this, for little is known of the processes which occur when an individual moves from one stage to the next (Lovell, 1971, pp. 28-31). One characteristic which could possibly influence the developmental processes is the individual's learning style.

Learning Style

Several views of learning style have evolved since the concept first began to interest researchers. These perspectives are revealed in the variety of the definitions and in the number of different styles which have been identified. Among these styles are the modes known as field independence-dependence (fi-fd).

Definitions. Learning styles, or the interchangeable term "cognitive styles," have been defined by Sperry (1972) as "information processing habits which represent the learner's typical mode of perceiving, thinking, problem solving and remembering" (p. 3). Kagan, Moss and Sigel (1970) more specifically state that cognitive style " . . . refers to stable individual differences in mode of perceptual organization and conceptual categorization of the external environment" (p. 204). A more recent definition by Cawley, Miller and Milligan (1976) again broadens the meaning to reflect the high level of the concept: "Cognitive style is defined as the ways in which an individual selects, organizes and processes the educative experiences in the environment" (p. 103).

Characteristics. A person's style integrates perception and thought to accommodate a variety of content areas. Witkin (1972) and Messick (1972) both affirm that the term "style" reflects the person's characteristic approach to a wide scope of situations. This infers that the approach is based on a particular understanding of the situation by the individual. One dominant influence which affects understanding is pointed out in studies by Gibson (1970) involving the nature of perception. She suggests that individuals structure perceptual units differently, a factor which could involve the manner in which relationships are formed or associations made.

Kogan (1972) clarifies the difference between cognitive abilities and style: abilities concern the level of skill, whereas style describes the manner and form of the process. Messick (1976) asserts that style is not to be confused with cognitive strategy, which is more readily responsive to training. An individual's style is a high order perceptual organizer which, though habitual, is not a habit, but rather a part of the total personality.

Witkin, Goodenough and Karp (1972) point out that individual differences result from the extent to which interrelated characteristics are focused on a particular commonality. These might include characteristic differences

between the processes of individuals such as those which are described by Shumsky (1972) as involving elements of rate, (tempo of learning), independence or self directedness, attentiveness, and reaction to new situations. Attentional processes have also been cited by Forer, Miller, and Fuller (1975) as being particularly significant in the cognitive styles of high risk children.

At least nine orientations toward cognitive style have evolved in the last thirty years (Messick, 1972, 1976; Kogan, 1971). Of these, the articulated (or analytical) versus the global (or relational) dimension has generated the greatest amount of research. Cawley, et al (1976) summarize the findings of Kagen and associates, and Cohen in this regard. In particular, they point out that the manner in which an individual functions tends to be stable over time and across a variety of learning situations. They suggest that cognitive style is independent of intelligence, for there are qualitative differences in both intellectual performance and skill development among individuals with relatively similar aptitudes as measured by I.Q. Even though an individual becomes more analytical as he/she grows older, differences still exist in the attentional processes and in the manner in which information is classified by different individuals.

The relationship between the analytic-relational orientations and field independence-dependence is also clarified by Cawley and his associates. An analytic style appears to be similar to field independence, and a relational style appears to be similar to field dependence. Either extreme is incompatible with the other, a characteristic which appears to pose problems among groups or individuals of different styles. Individuals may have a repertoire of both analytic and relational responses, however, and the degree to which they are primarily of one style or another depends largely on their socialization experiences within a particular primary group or groups (pp. 102-3).

Many of the generalizations listed by Cawley and his associates require further study and elaboration. However, the conclusions which have concentrated on the perceptual component of the articulated versus global dimension, namely field independence-dependence (fi-fd) have been documented by Witkin as well (1972).

Field Independence-Dependence (FI-FD)

The studies of Witkin and his associates represent the main body of evidence for field independence-dependence, a style which concerns the ability to deal with environmental

factors. Over a period of twenty-five years, Witkin has investigated the influence of this style on perception, problem solving, personality, vocational interests, and teacher-student relationships (Witkin, 1972; Kogan, 1972).

Definitions. Field independence (fi) is a style wherein "the person is able to deal with an item independently of the surrounding field" (Witkin, 1972, p. 5). The fi learner is analytic, and the style is associated with a longer attention span, greater reflectivity, and deeper concentration. He or she is less social than fd learners, and tends to be achievement oriented and competitive. Complexity is preferred, as is a formal learning situation (Cawley, et al, 1976).

Field dependence (fd) is, conversely, a mode of perceiving which is "strongly dominated by the prevailing field" (Witkin, 1972, p. 5), and the fd learner perceives stimuli in reference to the total context. The style is associated with a short attention span and distractedness. Informal, socially oriented learning situations are preferred. The fd learner is less competitive and achievement oriented, prefers simplicity and tends to focus on the relevance of the learning to the self (Cawley, et al, 1976).

Assessment. Individual differences in fi-fd have been assessed in three major ways (Witkin, 1972, pp. 2-5; Kogan, 1972, pp. 247-53). From these techniques, other measures have been developed.

1. Rod and Frame Apparatus (RFT). The subject is placed in a darkened room where all that is visible is a luminous square frame and a rod that is pivoted at the same center as the frame. The tester varies the degree of tilt in either the rod or frame, or both, and the subject is asked to adjust the rod to an upright position. Performance is evaluated according to whether the subject is able to accurately align the rod independently of the frame's influence. The score is based on the degree of deviation of the rod setting from the true vertical position.

2. Body Adjustment Test (BAT). The subject is placed in a small room into which a chair is projected. Both room and chair can be tilted together or independently in either a clockwise or counter-clockwise direction. The subject is asked to sit in the chair and adjust it to an upright position. Scoring represents the deviation of the chair's adjustment from the true vertical position.

3. Embedded Figures Test (EFT). After being shown a simple figure, the subject is asked to locate it in a complex organized field. Performance is evaluated according to the time the subject needs to find the figure. Three minutes is allowed for each item on the test.

Variations in the above tests include a smaller portable rod and frame apparatus that does not require a darkened room, and adaptation of the EFT to provide a children's version (Witkin, 1972, p. 5). A group form of the EFT has also been developed.

There have been high levels of consistency between each of the major tests for individuals when they have been used with subjects between the ages of 8 and 21 (Kogan, 1972). Group measures show greater variability, however. Witkin (1973) has found that while the individually administered EFT has identified sex differences in fi-fd, until 1972 the group form of the same measure had not. Vernon (1972) believed that group paper and pencil tests of fi do not define a factor separate from that measured by intelligence. Satterly (1976) tempered this conclusion with his interpretation of studies using alternate forms of the EFT, and with his own recent finding that a small factor of cognitive style, as measured by a group version of the EFT in multiple choice paper and pencil format, does exist which does not overlap intelligence or spatial ability.

Apart from the EFT, other instruments have been developed which measure an analytical ability. These include the Hidden Figures Test (HFT, form Cf-1); the Hidden Patterns Test (Cf-2); and the Copying Test (Cf-3). The HFT is a relatively difficult paper and pencil instrument originally developed by French, Ekstrom and Price (1963) and later revised (Ekstrom, French, Harman and Dermen, 1976). Initially the test was designed for use with subjects in the 6th through the 16th grades, but the revision is for grades 8 through 16. The task of each item is to identify which one of five simple figures is hidden or embedded within a complex pattern. In addition to illustrated examples, there are two parts to the timed test, each with 16 items; the subject is allowed 10 minutes to complete each part.

The HFT, as well as the other two instruments, purports to measure flexibility of closure, a factor which is defined as "the ability to hold a given visual percept or configuration in mind so as to disembed it from other well defined perceptual material" (Ekstrom, et al, 1976, p. 19). Although it is questionable whether or not flexibility of closure and fi-fd are identical constructs, these measures are increasingly used by investigators of fi-fd due to an apparent relationship demonstrated in research. For example, the HFT has been shown to be related to individual performance

on the EFT or the RFT. Weissenburg (1973) reports an approximate median correlation coefficient of .51 when used with a variety of populations. Greater relationships were evident when males were the subjects. Despite the fact that the population included more groups of males than females and that the correlation coefficient was particularly low for one of the two female groups, Weissenburg concluded that the HFT, Cf-1 offered a reasonably effective and practical means of testing large numbers of subjects within a short length of time (p. 462).

Norms for the HFT, Cf-1 are based on an unpublished study of 300 males and 330 females in the 11th and 12th grades. The reliability of the test when used with males was .82, and when used with females it was .80. The mean and standard deviation of males' scores were 15.8 and 7.4, respectively, and similar data for females were 14.2 and 6.6 (Ekstrom, et al, 1976, p. 11). Data compiled by other investigators reflects variances in administrative procedures. Davis (1967) found a range of 1.00-37.00 using a correction factor for scoring, and determined the mean for 310 male high school seniors to be 18.59 when subjects were allotted 15 minutes to complete each part. Frederick (1968) used Part I of the HFT to study 256 sixth, eighth, and tenth graders. Twelve minutes were allowed for completion, and work on each item was

paced. Scores showed a mean of 5.75 with a standard deviation of 2.60. Hoyt's reliability was .496. Persons who scored 6 or above were considered to be significantly analytical. Weissenburg cites data compiled by Gruenfeld (unpublished study, 1972, cited in Weissenburg, 1973, p. 462) which indicated that individuals who have a total score of 15 or above on the HFT Cf-1 invariably are scored as fi on the RFT. It was also noted that the reverse is not true, for individuals rated fi on the RFT do not always score 15 on the HFT.

Characteristics. The majority of studies of fi-fd have focused on identification of learning style and on issues of individual differences and self-consistency as they are manifest over time and in a variety of situations. The information gained from this assessment is now being related to broader areas of personality and the forces which influence a child's development of and within a particular style. Much of the reported work substantiates the broad findings already described (Cawley, et al, 1976).

Field independence-dependence appears to be normally distributed throughout the population. Like other styles, fi-fd is bipolar in nature inasmuch as each extreme represents a different set of interacting characteristics. Scores of fi-fd form a continuous distribution, thus

indicating that this dimension can be defined relative to the mean (Witkin, 1977, p. 43). Individuals may, therefore, be extremely fi or fd, or possess either quality in varying degrees. Wapner (1976) speculated that individuals might actually possess a range of fi-fd which responds to environmental factors (p. 76).

Little is known about the characteristics of persons in the low ranges of either fi or fd, but research findings have noted a number of behavioral differences in persons who are extremely fi or fd. In addition, there are variances between interests, attitudes, and preferences as well as tendencies associated with each extreme that appear to extend even to characteristic pathologies. The following discussion of behavioral differences, relationship to ability and achievement, and sex differences highlights some of the variances.

1. Behavioral differences. The behavioral differences in fi-fd which reflect personality have been studied by Witkin (1972, 1977). Field dependent persons tend to be more easily influenced than fi persons by the opinions of authority figures or role models, and rely heavily on the opinions of others in their definition of self. Likewise, they appear to be more sensitive to the interactions between individuals in their environment, and because of this they remember

more clearly than fi persons those messages which have a high social content. They are affected to a greater degree by praise or criticism. Their social skills are usually highly developed, and consequently they often become involved in occupations that require interactions with people. Field dependent persons find it more difficult to make choices regarding occupations than those who are fi, and tend to move from analytically oriented, less social vocations to those where they can work with and for people. In contrast, fi individuals make career choices earlier in life, and change these choices less often, than do the fd. Field independent persons favor the less social, analytically oriented vocations such as science, mathematics, or technology, although they can be found in the analytical components of most vocations. Once an occupational choice is made by an fi individual, it is rarely changed. In addition, fi persons appear to be more self-referent; they seem to have a greater sense of separate identity as shown by the stability of their responses when asked to give a self description related to four situations (Witkin, 1972; 1973, p. 28; and Messick, 1972, p. 107).

Certain factors of interests and attitudes have been aligned with fi-fd. After completing studies of engineering students, Arbuthnot and Gruenfeld (1969) contended that educational-vocational interest can be predicted by fi-fd

as measured by the RFT. Victor (1976) examined prospective teachers of emotionally disturbed children to ascertain their judgments of professional competence and interpersonal-social factors of their peers. It was found that teachers who were both fd and dogmatic (relatively closed to new ideas) tended to be viewed as less professionally competent.

The tendency to be fi or fd has implications for mental health, for while Messick (1972) points out that no general relationships have been found between an individual's cognitive style and his/her socio-emotional adjustment or mental health (p. 107), Witkin believes that fi is the cognitive component of a deeply engrained personality syndrome (Kogan, 1972). His studies of the form of the defense mechanisms used when confronted by conflict or stress, and the type of expression of pathology, show that there is a variance on these factors according to the cognitive style of the individual. Articulated (fi) persons tend to intellectualize or isolate as defenses, and their pathologies usually involve overcontrol or delusions. Global (fd) subjects are more likely to deny or repress, and their pathology is expressed through dependence and related psychosomatic illness as well as hallucinations (Messick, 1972). Thus, the impact of any particular style extends to the realm of personality and colors one's perception of life experiences.

2. Relationship to ability. The relationship of fi-fd to intelligence remains unclear, although it appears that in those areas which are influenced by one's ability to isolate items in context, there is a substantial overlapping with the factor as measured by traditional aptitude tests. In Kogan's summary of the work of several investigators on this issue (1972, pp. 250-1), a significant relationship between fi and general intelligence is noted. Particularly, correlations among analytic style and mathematical abilities are described. Witkin believes that fi-fd exists apart from general intelligence, and that any correlation with verbal comprehension, mathematical or spatial skills only indicates the degree to which an individual's style permits him or her to overcome embeddedness. Kogan proposes that it is a spatial property, rather than analytical orientation, that overlaps the above components of intelligence. Thus, a fi individual could have an advantage when working with tasks requiring analytical ability, but this does not necessarily indicate a superiority in general intelligence. This is illustrated by Witkin's study of retarded children in the 60-80 I.Q. range who were shown to be only slightly below the average of their age in analytical abilities.

If general intelligence is viewed as being potential adaptability to the environment, it can be argued that the

advantage of one particular style over the other depends on its suitability for a given situation. For example, the fd individual might have greater difficulty in driving an automobile through a heavy flow of traffic when multi-lanes and interchanges are involved, but yet be very competent in understanding and pacifying an irate customer in a supermarket on a busy afternoon. The fi individual might function superbly when confronting an income tax form, but be less patient in a committee meeting that was run democratically.

3. Relationship to achievement. Achievement is associated with both fi and fd cognitive styles, but the orientation varies for each; it also appears that the degree to which an individual possesses other cognitive factors which interact with style is an important influence. Witkin (1972), in integrating the results of numerous studies which show the relationship of fi-fd to high achieving students in either a particular subject or in a designated professional area, and to persons already working in professions, reports that fi individuals tend to be found in analytical-skilled areas such as engineering, mathematics, mechanics, etc. Field dependent individuals are more likely to be successful in areas requiring interpersonal relations skills such as teaching, social work, etc. Of the two styles, fi is the most versatile in that fi persons can be successful in typically fd-oriented occupations, whereas the reverse is not true.

Certain combinations of cognitive style and verbal comprehension result in patterns which can also project individual ability and functioning. The notation that culturally deprived individuals often have a "cognitive split" composed of fd and low verbal comprehension, suggests that a synergistic effect might result from various combinations that could relate to achievement (Witkin, 1972, pp. 10-15). This also could perhaps explain apparent contradictions which are manifest when an individual selects an analytical aspect of a typically fd occupation such as psychology, or vice versa.

4. Sex differences. Whether or not consistent sex differences exist for a particular cognitive style remains unclear. Cognitive style development is related to socialization, a process which may be different for girls or boys. Witkin (1972, 1976) asserts that sex differences in fi-fd are evident, but other reports are inconsistent. The disagreement could stem from myriad cultural factors such as different expectations and opportunities for males than females, and from different child-rearing practices. Witkin's studies have reported a greater tendency toward fd in females than in males despite cultural differences, a conclusion similar to the findings of Kagan, Moss and Sigel (1970, pp. 73-124) in their investigations of analytic-descriptive, inferential-

categorical, and relational conceptual styles. These orientations appear to be somewhat similar to Witkin's fi-fd, in the sense that they differentiate degrees of analytical ability. In looking at the greater variability of responses for females, Kagan, et al also found that girls tend to give fewer analytic responses than boys.

Another application of Kagan's conceptual styles was seen in a 1973 study (Ogunyemi). One hundred seventy low and high science achievers in three grade levels (7th, 12th, and 2nd year junior college) in Nigeria were compared on a basis of science achievement and cognitive preference. Results revealed that of the 90 male subjects, high science achievers differed significantly in cognitive style from low science achievers. Of the 80 female subjects, there were no consistent differentiations in the styles of high and low achievers. It could be speculated that this lack of dichotomy in females resulted from a number of factors: Nigeria is a developing country which has only recently extended educational opportunities to both men and women. There might be a difference in the academic orientations and experiences of each; also, the culture of the country has not placed particular value upon the analytic abilities. The girls, who according to Witkin might be expected to be relatively fd, would be then more sensitive to these pressures and reflect this in their response. This would

also be consistent with Kagan's finding relating to the influence of family groups.

A study by Gray and Knief (1975) of 275 5th grade children was also inconclusive. Using instruments developed by Kagan, Moss and Sigel, they compared cognitive style and school achievement. Their findings indicated a low relationship existed, whereby descriptive style was positively related and relational style was negatively related; but when additional analyses of style, sex, I.Q. and achievement were made using analysis of variance, no significant relationship was identified.

Wasik and Wasik (1972) detected slight changes in the type of strategies used by nonlearners and learners between grade levels in a study of culturally deprived children at the kindergarten, first and second grade levels. However, there did not appear to be any correlation between the type of strategy used and grade, race, or sex.

Another investigation involving sex differences was conducted by Doyal and Forsyth (1972). Third grade subjects were pretested on their ability to construct simple and complex anagrams. After completing the task, situational anxiety was induced by informing the students that they had done poorly and that they would have to repeat the test. The test was administered a second time, and the results compared. No significant differences were evident except

for the correlation by sex of simple and complex problem solving with anxiety. The girls appeared to be more affected by anxiety than the boys, although an optimum level improved the performances of both sexes. Greater levels of anxiety motivated the more anxious boys, but did not affect the performance of those with low anxiety. The opposite was true for girls, for those with initially low anxiety were more productive in the stressful situation. The performances of those who were normally anxious were lower when additional anxiety was induced. Since the problem solving tasks may have involved an analytical factor similar to fi-fd, it can be argued that the difficulty experienced by the female subjects substantiates Witkin's supposition that females tend to be generally fd and therefore more susceptible to environmental influence.

Instructional Style

The number of model programs and techniques of instruction which have emerged in recent years attests to the interest which is developing in regard to differences in teaching modes. Traditional approaches have been compared to innovations at all educational levels. Nevertheless, it is difficult to attribute the qualities of effective teaching to any one approach; they are elusive and enigmatic. Attempts have been and are being made,

however, to describe the process of teaching as it differs between teachers.

Definitions. Instructional style has been defined by Gagne' (cited in Sperry, 1972) as " . . . the way in which the external learning situation is controlled: with commanding attention, with presenting stimuli, and with the nature and sequencing of verbal directions given to the learner" (p. 186). In the last fifteen years, instructional style has been scrutinized in order to understand more fully the nature of the instructional strategy and its affects on the learner. Since numerous elements appear in the instructional process, Lesser's (cited in Sperry, 1972) more recent definition of instructional strategy broadens the scope to include curriculum choices, content, level, sequence, pace and style of presentation (p. 186). The comprehensiveness of the term can be better understood when it is noted that a variety of dimensions have been investigated. Among these are the student-versus content-oriented; learner versus teacher-oriented; authoritarian versus democratic versus permissive; structured versus unplanned; discovery versus expository; direct influence versus indirect influence, etc.

Since much of the authority for determining the focus, method, and content of the instructional sequence rests with the teacher, assessment of his/her style can be an effective primary step in describing the learning environment. If, for example, the teacher's learning style influences his/her adaptability to a given situation, the appropriateness of the instructional strategy will reflect this adaptability.

Assessment. Observation and self report tend to be the basic types of assessment procedures used for determining instructional style. Generally these have been focused on the socio-emotional and cognitive climate, using non-verbal and verbal communication factors as clues. Instruments such as the widely used Flanders (1964) matrix system for interaction analysis have been developed to aid in the assessment of instructor behavior as it affects the learning situation. This ten-category system (Appendix B) classifies verbal behaviors according to whether they are originated by the teacher or the student, and whether they typify direct or indirect influences toward learning.

Inter and intra-rater reliability are factors which must be considered in the interpretation of the matrix. Judgments must be made by the rater concerning the categorization of various types of activities in order to

obtain the consistency needed for reliable observation. The process tends to become routinized for the observer, and after training the reliability is usually quite high. Flanders suggests that a Scott coefficient of +0.85 would be a reasonable level of reliable performance (p. 15).

Since the development of the Flanders system, several other matrix designs have expanded and clarified some of the components of the original form. Brown, Ober, Soar, and Webb (cited in Webb, 1970) categorized instruction according to where it related to the seven levels of the cognitive domain of Bloom's taxonomy. Ober (1970) refined the matrix to elaborate on the quality of interaction, and multidimensional approaches were also used. In each of these systems, verbal interactions formed the basis for most of the conclusions, but attempts have been made to include non-verbal factors as well. The tendency is increasingly geared toward a multidimensional assessment in order to gain more data and provide a basis for comparison (Sperry, 1972, pp. 186-91).

The value of these measures lies in their identification of various classroom climates that can be eventually associated with another component: the facilitation of learning for students with particular cognitive styles. In the meantime, however, studies are directed toward isolating the elements of instruction that do comprise a

part of a teaching style, or instructional strategy. A description of some of these attempts is given in the following section.

Characteristics. Several available studies suggest that a teacher's cognitive style affects his/her strategy of instruction. Witkin's (1972) investigations have shown that teachers tend to be relatively fd, although this is less generalizable when specialty areas are considered. Tendencies which have emerged in clearly fd teachers point out their affinity for social interaction. They seem to be more attuned to the human interaction in the classroom as shown by their sensitivity in modifying the rate of their own speech to set classroom pace. They favor democratic procedures of leadership, and often discussion is used to facilitate instruction. The combination of dogmatism and fd typifies a rather unimaginative and unstimulating teacher. Field independent teachers, on the other hand, prefer more structured means of instruction such as lecture methods. In addition, studies of therapists and their clients by Witkin affirm that particular cognitive styles can be associated with directedness or nondirectedness. For example, fi therapists tend to be more directing than fd therapists (p. 25).

It seems logical that the options exercised by the teachers in the choice of goals, methods, materials, reinforcement, etc., would have different effects for different learners. In this respect, the teaching-learning process and the teacher-student relationship simulate to a considerable extent parent-child interactions and child rearing practices. In either case, a dominant influence is present to guide, encourage, and/or inhibit another. Recognizing this, much attention has been paid to the effects of parenting styles. Some of these studies might well have import for the teaching-learning processes.

For example, many of Witkin's beliefs regarding the influence of teachers are founded in studies related to parent-child and therapist-client interactions which show how parents' or therapists' style affected the relationship with the child or client. In particular, Dyk and Witkin's (1965) study of the techniques of mothers show variance between those with fi and fd children, leading to the conclusion that mother-child relations influence the child's cognitive style development. One difference is related to the specificity and organization of communications, a factor which would also relate to the

role of teachers. Mothers of fi children are more precise when describing or explaining events. The suggestion is made that highly verbal children who have discrepantly low spatial or numerical ability often have demanding or intrusive mothers, while the converse is also true; high spatial and numerical ability in children is associated with mothers allowing their children freedom to explore.

Futher documentation of the influence which home environment may have on achievement is shown by Fried's (1973) study of Head Start children. The quality of the home environment was found to vary despite economic conditions that were similar, and higher relationships existed between home environment and achievement than I.Q. and achievement. It seems likely that both home and school environments, and the guidance and instructional styles of parents and teachers, profoundly affect the learning process for the child. Gibb's (1976) description of defensive and supportive communication factors which can influence the climate of a classroom (or a home) aptly points out some of the behaviors which provoke strong responses in the responder. Included are elements which infer a hierarchy of authority, evaluation and control as

parts of a defensive climate, as well as components of problem identification, empathy and equality to comprise the supportive climate (227-321). It can be surmised that fi or fd individuals would each relate to any of the above factors differently, and thus be affected to a greater or lesser degree if any one of these factors was predominant in a learning situation.

Relationship of Instruction and Learning Style

Only recently have research efforts been directed specifically toward the study of the relationship of instruction and cognitive style of students. The practical implications for education are obvious, for as Messick (1972) points out, it is possible that teachers and students could be matched on the basis of their cognitive styles in order to optimally encourage learning. It would also be possible to identify methods which are especially appropriate for particular learning styles.

Some of the attempts which have been made toward identifying appropriate methods have been reported by researchers. Their investigations bring in several perspectives, and some resulting contradictions.

Again, generalizations have been made by Witkin (1972). He had found that fd children tend to benefit from discovery instruction, and notes that children with learning difficulties, particularly in reading, tend to be fd. Field dependent students are also more influenced by praise or criticism. Studies of teachers, therapists, and their respective students and clients show that they speak more highly of each other and are more interested in communicating if they are of similar cognitive styles (pp. 30-41). Ages of the teacher and the student may also be important. The possibility that some instructional styles may be more effective for certain age groups was proposed by Lucas (1970).

Yando and Kagan (1968) have demonstrated that response rates of children can be affected by teacher tempo. By matching reflective and impulsive teachers with students of the same style, they discovered that the style of reflective children was reinforced and enhanced by teachers who were also reflective. Weiss (1973) found a different situation; in studying the effects of different forms of conservation training upon children with different cognitive styles, no relationship was found with the leveling-sharpening dimension, a style which denotes the emphasis placed on differences. However, when analyzing the data in relation to impulsivity-reflectivity, it was discovered

that impulsives benefited more from reversibility training and reflectives from discrimination training.

Contrary to expectations, Neidt and Hedlund (1969) found no relationship between cognitive learning and affective outcomes in their study of three groups of psychology students taught by use of closed-circuit television. Students with diverging attitudes toward instruction did not differ in achievement from the predicted achievement of the total class, a result which suggests that while rapport between student and teacher is desirable, it is not necessary for achievement; the congruency of strategy to style may be the significant element.

An experimental study by Taylor, Chow, Hubner and Stripp (1976) investigated the validity of two methods of measuring competencies within two groups of inservice pre-school (Head Start) teachers and assistants with varying educational backgrounds. It was found that familiarity with method of instruction influenced achievement of the subjects, particularly at the beginning of instruction. Differences tended to disappear following training which related the theoretical basis of child development to experiential factors, thereby making the learning experiences less abstract.

An attempt was made by Elliott (1976) to match instructional treatment with the learner traits of field articulation and conceptual-tempo cognitive styles. Field independence-dependence was assessed by the children's EFT, and conceptual tempo was determined by the Matching Familiar Figures Test. The pilot study revealed a high correlation between the two measures and the aspect of conceptual tempo was consequently eliminated from the study. The hypothesis of the pilot study was that color highlighting of specific attributes and structured sequencing would aid the fd subjects. This did not appear to be the case, perhaps because of the distracting influence of the highlighting, so the reverse approach was used for the main study. Results supported the theory that instruction can be specifically designed to match learning style. It was also agreed that fi students tend to be superior in learning achievement, but this could be modified by varying the treatment.

A study of Wisconsin vocational and university students (Banks, 1973) identified learning styles on concrete-symbolic and structured-unstructured continuums using a researcher-designed Learning Activities Opinionnaire. A variety of vocational interests were represented; the pilot administration included three groups of child care students, and one group each of audio-visual tutorial typing, accounting,

and automobile technology students. Eleven different groups participated in the final administration, with enrollees in technical courses predominating. Hoyt's analysis of variance method of determining reliability was used to evaluate the instrument. The section measuring concrete-symbolic styles was low in reliability (.29 in the pilot, .22 in the final administration), but the coefficient for structured-unstructured learning was shown to be .80 in the pilot and .82 in the final administration. In both administrations, subjects favored the concrete learning style, including the child care students who scored slightly above to within 4 points of the midpoint of 30 on the structured-unstructured scale. Mean score for the 98 students participating in the pilot was 30.77 with a standard deviation of 3.58; scores from the final administration also clustered at the continuum midpoint, signifying that preferences for definite degrees of structure were indistinct for most of the other groups as well. Correlation with a semantic differential instrument used in the pilot showed little or no relationship between the concrete-symbolic and structured-unstructured learning styles for one of the child care groups. Following the final administration with a revised instrument, the researcher concluded that the factors were separate and independent of each other. However, it was also suggested that individ-

uals might possess a composite style or mixture of styles which facilitated their adjustment to different levels of structure.

Student response to separate items in Banks' scales was calculated from raw data supplied in his study. The results showed that child care students rated the following activities as being highly valued by them:

Working with tools, equipment and materials
Working with groups of students
Classes that teach job skills
Traditional lecture methods with av materials
Discussion activities

Activities deemed to be of little or no value included:

Self instruction using media
Instruction offered only through media
Instruction based on a vast amount of reading

Results regarding instruction dealing with formulas, figures and computations, or lab activities were less decisive.

Of the ten items related to structure, two were designated as being highly valuable by a majority of students:

Courses that allow me to set my own objectives
Courses that allow me to establish my own learning sequence and activities

Average value was assigned to the following activities:

Everything set up for me
Student centered instruction

Little or no value was the rating given to classes which did not involve any teacher-student contact (Item 19).

Responses were mixed on the following issues:

Teacher centered instruction
Lecture, note taking instruction
Completely organized courses
Working alone and setting my own pace
Student organized instruction

A follow-up experimental study conducted by Ingram (1976) used Bank's Learning Activities Opinionnaire to determine the impact of diverse instructional methods on individuals with concrete-symbolic styles. Audio-visual students were tested to identify equal numbers of students preferring concrete and symbolic styles. Two groups were formed for each style, and either a direct contact or abstract method of instruction was assigned to each group. After pre- and post-testing, the researcher found no significant different in cognitive skills between the groups regardless of treatment. Psychomotor skills attainment was significantly higher when the direct contact method was used regardless of learning style. Student reaction toward direct contact treatment was highly positive, while reaction toward abstract treatment was negative. The direct contact method consisted of a self-instruction booklet, equipment to study and manipulate, and assistance of a tutor. The abstract method consisted of an audiotape, playback equipment, and a set of four abstract line drawings without printed instructions. The only instruction given to the students was that recorded on the audiotape.

Summary

The preceding review of learning (cognitive) style and instructional style research suggests that specific modes do exist which influence other factors such as behavior, learning outcomes, preferences, interests, etc. These variances have not yet been fully defined. Witkin's studies have laid the groundwork for further investigation, and Kogan (1972) affirms the appropriateness of using the analytic global dimension as a basis for additional research on the interaction between learning styles and instructional methods. While this linkage remains unclear, some attempts to delineate instructional style have been made, particularly in classifying the classroom environment in regard to factors such as directness or indirectness, amount of structure, rate of presentation, concreteness or abstractness, etc. It may be concluded that while instructional style does affect learning outcomes, little is known of the specific effects when related to the learning styles of students, or the components of instructional style per se. Further investigation is needed to explore the synergistic effect of environmental factors and the personal orientations of teachers and learners.

CHAPTER II

METHOD OF STUDY

The preceding chapter outlined the theoretical and experiential parameters of the study as well as the general investigative approach. A detailed characterization of the population sample, instruments, design of the study, and research procedure is included in this chapter.

Nature of the Population Sample

Child care and development occupations students enrolled in diploma and associate degree programs offered by the Wisconsin Vocational, Technical and Adult Education (VTAE) system were the target population of this descriptive study. Teachers of required courses in these programs were also included in order to ascertain the instructional context that influenced the students' responses.

Selection of the Institutes

Since 1965, the Wisconsin VTAE system has developed 16 districts, each with a post-secondary institute encompassing one or more campuses. The districts have been established on the basis of population, geographical, economic, and social characteristics. Of the 16 districts, nine offered one-year child care assistant diploma programs in 1976. Associate degree programs in child care and

development were offered in five districts, and two districts offered both types of programs. Geographically, the districts offering child care training programs are located throughout the central and southern portion of the state, extending to the east and west boundaries.

Four centrally-located VTAE institutes were requested to participate in this study: (1) District I Technical Institute, Eau Claire; (2) Western Wisconsin Technical Institute, La Crosse; (3) Fox Valley Technical Institute, Oshkosh campus; and (4) Midstate Technical Institute, Wisconsin Rapids. Each of these institutes is located in a basically rural geographical area, although the districts do include urban centers which offer opportunities for business and manufacturing.

Characteristics of the Subjects

An attempt was made to include students from one and two-year programs. Both levels of vocational preparation were available within the selected cluster of institutes. Two classes included in the sample involved students in a one-year diploma program, two classes were comprised of first year associate degree students, and one class enrolled second year associate degree students. Enrollment in all of these classes totaled 88 students; because of absences, 76 participated in the study. In three institutes, one teacher was observed while working with a single group of students. In

the fourth situation, one teacher and two different groups of students participated.

Demographic information obtained from the students is reported in Table 1.

Table 1

Demographic Characteristics of the Subjects

Characteristic	Number	Percent
Age		
18-20 years	51	67
21-25	21	28
26-30	2	03
31-35	1	01
36-over	1	01
Sex		
male	0	00
female	76	100
Childhood home		
rural area	22	29
village or city under 10,000	22	29
city between 10,000-39,000	9	12
city between 39,000-150,000	23	30
city over 150,000	0	00
Children in parents' family		
1 child	1	01
2-3 children	17	22
4-5	32	42
6-7	14	18
8 or more	12	16
Birth order		
first	13	17
second	17	22
third	20	26
fourth	11	14
fifth or other	15	20

Table 1 illustrates that the majority of students were under 20 years old, and only five percent were older than 26 years. All were women who had grown up in rural areas or cities under 150,000 population; over half of the group grew up in a rural area or city under 10,000 population, but approximately one-third had lived in cities between 39,000 and 150,000 population.

An interesting characteristic was the number of children in the students' parental families. As shown in Table 1, over 76 percent came from families with four or more children. This includes 16 percent with eight or more offspring. The birth order of the subjects showed a predominance of later-born children; twenty percent of the group held the fifth or later-born position, while 17 percent were first-borns.

Thus, the sample group of students were young women who were later-born siblings in relatively large families. Most lived in less populated areas although a substantial portion were from moderately-sized cities. No demographic information on the teachers was obtained.

Design of the Instruments

The instruments used in the study included the Hidden Figures Test (HFT), the Flanders interaction analysis matrix for systematic observation, and a Preference Survey (PS). Each instrument is described in this section.

Hidden Figures Test (HFT)

The HFT is designed to measure flexibility of closure, a cognitive factor which is defined as the "ability to hold a given visual percept or configuration in mind so as to disembed it from other well defined perceptual material" (Ekstrom, French, Harman and Dermen, 1976, p. 19). Developed in 1962 for research purposes, the HFT measurement appears to be related to the construct of field independence (fi). Although it is questionable whether flexibility of closure and field independence are identical, the HFT was selected for use in this study because of the increasing acceptance it has gained as a measure of an analytic factor such as fi-fd. In addition, it is relatively simple to administer and score. The researcher was permitted to use the copyrighted instrument (Educational Testing Service, 1962) through a licensing agreement (See Appendix A). The original 1962 version was used.

There are two parts to the HFT. Both are of high difficulty, a fact attested to verbally by the participants of the study. The prescribed instructions specify that the subjects be allowed ten minutes to complete each half of the test. A total of 32 multiple-choice items are included, with 16 items in each part. The objective of each item is to locate one of five simple figures in a complex pattern. The same five figures are used throughout the test; they are

always depicted in the same perspective and size as in the example illustrations. Only one figure is included in each pattern.

The HFT is scored by tallying the correct number of responses for each part, or by utilizing a correction factor. In this investigation, the former alternative was chosen. Possible scores ranged from 0-32 using this approach. For purposes of this study, scores of 0-14 were designated as representing fd; scores of 15 or over indicated fi. Because fi-fd exists in varying degrees, the scores were further categorized to show high, moderate, or low fi-fd (See Table 2).

Table 2

Categories of FI-FD According to HFT Score

Learning Style	Category		
	high	moderate	low
field independence	25-32	20-24	15-19
field dependence	0-4	5-9	10-14

As shown in Table 2, the categories encompassed possible scores below and above a raw score of 15, thus giving six degrees of fi-fd. Combinations of the fi-fd categories were used to differentiate between the relative extremes identified in learning style of the subjects. The moderate

and low fi groups were combined with the low fd groups to constitute the fi classification, and the moderate and high fd categories were treated as separate groups.

As used in this study, the Spearman-Brown split-half formula (Walker and Lev, 1969, p. 233) gave a correlation coefficient of .82 for the total test, with .814 for Part I and .745 for Part II. This is comparable to the .80 reliability coefficient listed by Ekstrom, et al (1976).

Flanders Interaction Analysis

The Flanders method of interaction analysis has been extensively used for systematic observation of instruction and student behavior. Events are observed, recorded and counted using ten categories of interaction: six of the teachers' verbal behavior, three which classify that of the student, and one which represents silence or confusion. Appendix B lists the categories and illustrates how frequencies are shown on an example matrix.

Data for the matrix are gathered as the observer keeps a continuous tally of numbers, each of which represents a category. A record of the behavior is made every three seconds, thus it is possible to note when and in what direction changes occur. At least 400 tallies should be included in a 20-minute homogeneous activity period before an interpretation is made. The tallies are paired sequentially when entered into the 10 x 10 matrix in order to describe

the interaction. Visual and/or statistical interpretation of the matrix is used to identify a predominance of teacher or student talk, and direct or indirect influence. The amount of time spent in specific types of communication can be then identified, as well as the typical transition modes used by the teacher.

Reliability of the Observer. Although the amount of training needed to observe accurately varies for individuals, a minimum of four hours is recommended. Twelve hours would result in a more optimum level of observer reliability. The procedures followed by the researcher to ensure inter- and intra-observer reliability included (1) completing programmed instruction in the technique using training tapes, (2) making practice observations in classes prior to the onset of study, (3) simultaneously audio-taping class activities that were being observed, and (4) transcribing twenty minutes of the audiotape for each class at a point where relatively greater amounts of teacher-student interaction occurred, and comparing this sample to the original observation of that episode. Intra-observer reliability on these samples is shown in Table 3.

Table 3

Intra-Observer Reliability Using
Scott Phi Coefficient* and
Percentage of Agreement

Group	Scott Coefficient*	Percent Agreement
1	99.7	80.34
2	99.6	84.06
3	99.8	77.10
4	99.7	85.10
5	99.7	84.00
average	99.7	82.12

* $\pi = \frac{P_o - P_e}{1 - P_e}$

The reliability coefficient was 99.7 percent for 20 minutes of observation of activities of five groups when using the Scott formula and calculation procedure recommended by Flanders (1964, p. 10). Since this method is based on data from the two categories showing the greatest number of tallies, thus reducing the influence of possible error, a reliability measure using percentage of agreement based on data from all categories is shown. Reliability with this method was .82. Appendix C reports the percent of agreement for each category for each group.

Difficulties encountered by the researcher in transcribing the audiotape included (1) less sensitivity to non-verbal encouragement and verbal inflections, thus making

categorization of statements which praise and/or reflect feelings and ideas more error-prone; (2) occasional indistinct voice discrimination between students or between teacher and student, and (3) greater tendency to overlook isolated remarks by either teacher or student than when observed in the classroom.

Procedures of observation and analysis. The data for the 10 x 10 matrix were tallied by a computer using a chi square program designed specifically for the Flanders system (Morss, 1976). Results included a count of interactions for each cell in the matrix, plus a description of the relative amount of teacher versus student talk and the ratios of direct and indirect influence.

For this study, approximately 9,000 tallies were analyzed. Each of the five groups was observed for a minimum of 90 minutes of varied activities. From this data, 90 minutes of tallies were recorded in a matrix for each group. This information was used to determine the degree of structured versus unstructured activities in each class. The sum of tallies in categories 4, 5, and 8 gave the index for structure, since these interactions were most likely to be teacher-planned and dominated. A corresponding measure, that of silence or confusion, was also used as a second indicator of structure; the supposition was that a low tally in this category (10) would denote more extensive interaction that had been planned.

From the original 90 minute sample, 20 minutes of interaction were selected from each group. The mini-sample was used to calculate reliability as previously stated, but also to indicate the relative directness and indirectness of each teacher's instructional style. In this case, the percentage of time spent in each type of interaction was the measure used to determine the ratios of teacher-student talk and indirect-direct to the total interactions.

Preference Survey (PS)

The final instrument used in the study was the researcher-designed preference survey, a copy of which is contained in Appendix D. The self-reported instructional preferences of the students were considered to be responses to previous learning experiences, and therefore indices of teacher-student interaction. Interaction within typical instructional situations would incorporate for a number of variables which could influence a fi or fd student. In the analysis of student preferences, an attempt was made to focus on situations that portrayed the continuums of the selected variables. Each section of the instrument was developed to procure specific data related to one variable.

Students responded directly on the three-part instrument which consisted of 31 items. The introductory five items were multiple choice Likert format; each distractor

was given a numerical value from 1-5, with the low score assigned to the "strongly disagree" category and the high score given to the "strongly agree" option. The 10 items in Part III were similar to a semantic differential scale; choices again were given a numerical rating ranging from 1 for definite preference for less structure to 5 for definite preference for more structure.

Variables measured by the instrument. The Introduction as well as Parts I, II, and III are described below:

1. The introductory items requested demographic information: the age, sex, geographical location of childhood home, number of children in the parental family, and birth order of the respondent.

2. Part I measured course satisfaction and achievement, factors which were of incidental interest in the study. Four items were concerned with course satisfaction, including interest, amount of learning, usefulness of the content, and willingness to recommend the course. A total score was compiled for the items, thus an individual could rate the course from 4-20 by responding to the items. The student's perception of his/her achievement was measured on a scale of 1-5 by a single item, number 10, in Part I. The low score was given for an indication of failing, and the high score for excellence.

3. Part II revealed student attitudes related to

direct or indirect instruction using the Flanders categories as a basis for item construction. One item was designed for each category with the exception of category 2 (praise and encouragement). For this component, two items were included which represented the extremes of praise and criticism when related to performance. A total score was compiled for the 11 items in this section, thus the subject could indicate preferences ranging from a low score of 11 for direct to a high score of 55 for indirect instruction.

4. Part III described student preferences for structured versus less structured teaching methods. Ten items were designed which contrasted the degree of structure in twenty methods paired accordingly to basically similar activities. An attempt was made to include a wide range of instructional methods which would be familiar to the students. Their choices between methods in each pair were indicated by checking whether their preferences tended to be definite, less definite, or undecided for a particular method in the pair. A total score was computed which could have ranged from 10 for preferences for relatively less structured methods to 50 for structured approaches.

Reliability of the instrument. The preference survey was pilot tested prior to the investigation. A total of 36 students in selected sections of research methods,

educational psychology, and family life courses completed and critiqued the intial form of the survey. After the pilot test it was revised to clarify some items. Additional items were included as well. A committee of four educators from the University of Wisconsin-Stout reviewed each item before the pilot testing, and approved the revised form of the survey. Table 4 reports the reliability of each part of the survey as used in the study after revision.

The number of items in each part of the test was small, a factor which have influenced the analysis. Nevertheless, the Spearman-Brown formula indicated strong reliability for Parts I and III with r = .86 and .82, respectively. Reliability for Part II was lower, with r = .55.

Table 4

Reliability of Parts I, II, and III of the Preference Survey

Analysis	Part I		Part II	Part III
	Items 6-9	Item 10		
Spearman-Brown r coefficient	.86	1.00	.55	.82
Standard Error of measurement	.95	0.00	2.96	4.00

Procedures of Investigation

Following a survey of related literature in the initial phase of the study, the instruments that were to be used in the collection of data were assembled and pilot tested. Participating VTAE institutes were selected, and a preliminary visit was made to each site to discuss the purpose and procedures with the teachers involved. Dates were established for observation of the class activities and for the administration of the HFT and PS. An attempt was made to schedule the subsequent visits during times which were as mutually convenient as possible. Following these arrangements, the collection of data proceeded as planned.

Measuring Instructional Style

The activities of each class were observed before the instruments were administered to the students. Observations were made using the Flanders systematic observation procedures and the verbal exchanges were audiotaped for later reference. The length of observation time varied considerably, with 2-5 hours recorded for each group, depending upon whether or not a representative sample was obtained, and whether time allowed lengthy observation.

The classes in all of the locations tended to be scheduled in blocks of time where the teacher and student would interact more or less continuously on several different

topics, thus facilitating the observation of different instructional formats.

From the data recorded in these periods, a sample of 90 minutes of varied instruction was selected for each group. An attempt was made to include activities that were common to all groups. A subsample of 20 minutes of discussion-oriented interaction was also chosen from the original 90 minutes; this section was transcribed from the audiotape, and compared with the original observation. The selected data were analyzed by a computer.

Measuring Instructional Preferences and Learning Style

The preference survey and HFT were administered to the students following the observation at a time designated by the teacher. One hour was required to complete both instruments. The preference survey, which was given first because it was less difficult and anxiety-producing, was completed by most students in 15 minutes. More time was allowed if necessary. The HFT required a minimum of 20 minutes to complete in addition to time for relaying instructions. Directions were explained in detail and questions answered. The students were informed that questions for clarification could be asked during the test if necessary.

Scoring and analysis of both instruments were done by

a computer using appropriate programs for descriptive statistics (Morss, 1976).

Summary

The following general procedures were used in the descriptive study of Wisconsin VTAE child care and development occupations students' learning style and instructional preferences, and their teachers' instructional style:

1. The researcher observed and audiotaped class activities of each group and recorded verbal interaction related to direct and indirect instruction using the Flanders method of systematic observation for interaction analysis.

2. Following the observation, a researcher-designed Preference Survey and the Hidden Figures Test were administered to the students.

3. The resultant data were computer analyzed with the aid of appropriate programs and interpreted by the researcher.

CHAPTER III

ANALYSIS OF DATA AND RESULTS

The instruments and procedures used in the collection of data are described in Chapter II. The target population and the characteristics of the population sample are also discussed. In this chapter, the process of data analysis and the resultant findings are reported.

Identification of Learning Style

Identification of student learning style was the primary undertaking of the study. The HFT score of each student was determined in order to measure the degree of fi-fd which characterized the individual's learning style. Possible limits of the continuum ranged from a low of 0, signifying extreme fd to a high of 32, indicating extreme fi. Distribution of scores within the categories of high, moderate, or low fi-fd for the group is reported in Table 5.

Table 5

Score Distribution in FI-FD Categories

Category	Scores	Number	Percent
1 (High fi)	25-32	0	00
2 (Moderate fi)	20-24	1	01
3 (Low fi)	15-19	7	09
4 (Low fd)	10-14	21	28
5 (Moderate fd)	5-9	25	33
6 (High fd)	0-4	22	29

Table 5 illustrates the skewed distribution of scores in favor of fd. Of the 76 students, the scores of 68 are below 15, the point selected to designate fi. Thus, the portion of the research hypothesis which predicted a predominantly field dependent learning style is accurate for this student population. A full range of fd is shown, with every score between 0-14 represented at least once. All except one of the remaining 8 students ranked in the category of low fi. The distribution of scores is also illustrated in Appendix E.

The status of all students' performance on the HFT is summarized in Table 6. Since parts of the HFT have been used in previously cited research (Frederick, 1968) as well as the complete instrument, the scores for each half are included as well as the total score.

Table 6

Status of All Students on the HFT

Descriptor	HFT-Part I	HFT-Part II	Total
N	76	76	76
Mean	3.84	4.22	8.07
SD	2.75	3.01	5.01
SE	1.48	1.49	2.13
R*	.75	.78	.82

*Spearman-Brown formula

As shown in Table 6, students' mean scores increased slightly between Parts I and II, from 3.84 for Part I to 4.22 for Part II. A t-test for independent samples showed that the difference was not significant at the .05 level. The mean for the total scores was 8.07 with a standard deviation of 5.01. Appendix F includes the HFT status of students in each of the five classes participating in the study.

Further analysis was made of the HFT scores to identify which students' scores differentiated by more than four points between parts of the HFT. Table 7 reports the amount of change for each student thus affected. Students whose performance scores varied to the greatest degree between HFT-Part I and Part II were those in the three middle categories; 3, 4, and 5. Increased as well as decreased performances were found in each category, but the variance was most prevalent in the low fi group. The students whose scores increased between the two parts achieved relatively low scores in Part I. Conversely, the students whose performances decreased were able to compile relatively higher scores initially, but did not maintain this level.

A t-test for independent samples found that there was no significant difference between the total scores of the two groups, but the 5.1 points difference in means between HFT I and II for the eight students whose scores increased

Table 7

Students with 4+ Points Difference
Between HFT-I and HFT-II

SS I.D. number	HFT-I	HFT-II	Total	Category*
Increase:				
8	4	10	14	4
20	1	10	11	4
30	2	6	8	5
44	5	9	14	4
48	1	5	6	5
49	6	10	16	3
63	7	12	19	3
68	2	7	9	5
Mean	3.5	8.6	12.1	
Decrease:				
4	12	5	17	3
11	8	1	9	5
34	8	0	8	5
43	7	3	10	4
56	6	1	7	5
Mean	8.2	2	10.2	

*3 = Low fi
4 = Low fd
5 = Moderate fd

was significant at the .01 level for 14 degrees of freedom ($t = 4.35$). For the five students whose scores decreased, the 6.2 points difference in means between halves was significant at the .05 level with 8 degrees of freedom ($t = 3.06$). Comparison of the means for each part of the HFT between groups found differences significant at the .01 level with 11 degrees of freedom for Part I, and at the .01 level with 11 degrees of freedom for Part II. The variance in the groups resulted from the different locus of their best performance; the group whose scores increased were able to adapt more effectively than the others.

Identification of Instructional Style

The instructional style of the students' teachers (N=4) was analyzed in order to characterize student-teacher interaction and thereby provide background information for interpreting student responses on the preference survey. Tables 8 and 9 report the amounts of structure and directness, respectively, for each group as indicated by analysis of the Flanders matrix.

As shown in Table 8, the amount of structure was substantially greater in three of the classes; in these groups, a higher percentage of time was spent in teacher questioning and giving information, and in students' responding when required by the teacher. Lesser amounts of silence or confusion were noted as well. The two remaining classes were

Table 8

Amount of Structure as Indicated by Selected Flanders Categories*

Class	Categories 4,5, 8 frequency 90 min. interaction**	% time spent	Category 10	% time spent
A	949	47	279	14
B	1203	60	67	03
C	1221	61	87	04
D	822	41	213	11
E	1224	61	19	01

*Category 4: asks questions with intent student answer
" 5: lectures
" 8: student talk in response to teacher
" 10: silence or confusion

**Each tally represents an event occurring at 3-second intervals.

less structured; and correspondingly, there was more silence or confusion.

Directness or indirectness in verbal communication was another instructional attribute assessed. It was hypothesized that the teachers would primarily utilize direct influence; this was verified by analysis of the matrix which indicated the ratio of indirect and direct to the teacher total for each class, and also by the relative amount of teacher-student talk. Table 9 describes the range of directness for all classes.

Table 9

Percentages of Direct-Indirect Influence and Teacher-Student Talk

Class	% teacher talk (-10)	% student talk	teacher-student ratio	% Direct-ness	% Indirect-ness
A	80	20	4.07	83	17
B	71	29	2.51	86	14
C	80	20	3.95	93	07
D	75	25	2.95	79	21
E	47	53	0.90	86	14
Average	71	29	2.88	85	15

While all teachers were shown to be predominantly direct, there was a variance of approximately 15 percent. Also, the division of teacher-student talk varied considerably, with student talk slightly surpassing the time spent in teacher talk in one of the classes. Thus, it can be noted that a teacher can be relatively direct and yet facilitate student verbal response, as in a required student report or discussion, for example.

Details regarding the total instructional context are reported in Appendix G. The number of interactions falling within each column of the matrix is shown for all of the classes. These quantities represent the pairings between tallies which make the matrix sensitive to the order of interactions, i.e. the transition from one category to another which is part of an individual's instructional style.

Identification of Instructional Preferences

Directness-Indirectness

Possible scores on the Likert-type scale of teacher directness-indirectness which constituted Part II of the Preference Survey (see Appendix D) ranged from a low of 11 to a high of 55. Low scores indicated strong preferences for direct instruction and high scores revealed that indirect instruction was favored. Table 10 reports the

data relating to the scores of all students; the distribution of the total scores and the responses for each class are shown in Appendices H and I, respectively.

Table 10

Preference Survey-Part II*: Response Toward Teacher Directness-Indirectness

Descriptor	Subject Response
Mean score	38.55
SD	3.07
Average response	3.50
Composite mean	3.51
Composite SD	1.15

*Spearman-Brown reliability = .55

Little variance in preferences for teacher directness-indirectness was seen in the total scores of students as portrayed in Table 10. The mean score for the group of 76 was 38.55, or 5.55 points above the test midpoint of 33. This would indicate a slight preference for indirectness on the part of the teacher, although the students did differentiate according to their perceptions of the importance of each approach to their learning or well-being (see Table 11 and Appendices J and K). The range was tightly clustered, with a standard deviation of 3.07. The average response to each item was 3.50 on a five-point scale.

Student responses in PS-Part II are detailed in Table 11 and in Appendix J. The percentage of responses indicating positive, undecided, or negative reactions toward the behavior described in the item are reported in Table 11, while Appendix J illustrates the distribution of responses for each item.

Table 11

Preference Survey-Part II: Percentage of Negative, Undecided, and Positive Response

Item	General Topic[1]	% Negative[2]	% Undecided[3]	% Positive[4]
11	feelings	02	00	98
12	praise	05	16	78
13	criticism	12	16	72
14	comments	11	38	51
15	questions	65	22	12
16	opinion	07	21	72
17	choice	07	12	81
18	criticism	18	17	64
19	questions	79	13	08
20	questions	10	14	75
21	silence, confusion	40	26	34

[1]see Appendix D for complete statement
[2]distractors 1 and 2
[3]distractor 3
[4]distractors 4 and 5

A majority of students agreed with all but three of the statements in Part II. Items 15 and 19, which stated that questions asked by the teacher either interfered with learning or bothered the students, evoked strong negative responses. Opinions relating to item 21 were not clearly differentiated, indicating a lack of consensus concerning whether or not silence or confusion during class bothered the student. A greater percentage of disagreement than agreement was shown, however. More students were bothered by silence or confusion than were undecided or not bothered.

Comparison of Learning Style and Preference for Directness-Indirectness

The students' total PS-Part II and HFT scores were analyzed further to determine the validity of the hypothesis. It was predicted that a relationship existed between these variables. In addition, student responses on each item were studied to ascertain whether any specific factors might be discriminatory. Appendix K reports the mean scores and standard deviations for each HFT group, while Table 12 presents the Pearson product-moment correlation coefficient for each of the following comparisons: (1) HFT raw score and total score for the PS-Part II, (2) HFT raw score and score for each of the 11 items in Part II, and (3) HFT group and score for each of the 11 items in Part II.

Table 12

Correlation[1] of Learning Style and Preferences for Teacher Directness-Indirectness

HFT	Item (see Appendix D)											
	11	12	13	14	15	16	17	18	19	20	21	Total
Raw Score	-.07	.13	-.1	-.12	-.11	.39*	-.03	-.04	-.19	-.01	-.01	.13
Group[2] Score	-.04	-.14	.11	-.01	.14	-.35*	.05	.09	.22	-.07	.01	

[1]Pearson product-moment coefficient
[2]I = categories 2, 3, and 4
II = category 5
III = category 6
*significant at the .01 level

As Table 12 reports, little or no relationship existed between the students' HFT raw score or group number and preference for teacher directness or indirectness as indicated by comparison with either the total Part II score or any of the items, with one exception: item 16. On this factor, respondents indicated whether or not it was important to their learning that the instructor used personal opinions and examples when giving information. The Pearson product-moment correlation coefficient for this behavior and fi-fd as shown by HFT score was .39, reflecting significance at the .01 level. Analysis of HFT group scores, in which the previously described categories (Chapter 2) were subsumed into three groups, confirmed the importance of this variable. Relatively fi students scored highest on item 16, thus indicating their preference for this type of instruction.

Structured-Less Structured Methods

Student responses to Part III of the Preference Survey (see Appendix D) are shown in Tables 13 and 14, and in Appendices L and M. Included is information regarding the total score and response to each item. Preference for structured or less structured learning activities was indicated by scores ranging from 10-50 on the semantic differential scale. A score below the midpoint of 30

points indicated choices for relatively less structured situations, whereas a score above 30 points revealed preference for structured activities. Table 13 presents data relating to the scores of all students; the distribution of all scores and the responses for each class are shown in Appendices L and M, respectively.

As Table 13 indicates, either structured or less structured activities were acceptable to the students. Preferences were indistinct, as shown by the mean of 31.38, which was but 1.38 points above the midpoint. The distribution of scores, which is illustrated in Appendix L, ranged from a low of 14, 4 points above the lowest possible score, to 50, the highest possible score. The standard deviation was 8.00 and the average response on a 1-5 scale was 3.14.

Table 13

Preference Survey-Part III*: Response Toward Structured or Less Structured Methods

Descriptor	Subject Response
Mean score	31.38
SD	8.00
Average response	3.14
Composite mean	3.15
Composite SD	1.55

*Spearman-Brown reliability = .82

The percentage of responses indicating definite or no preference for structured or less structured learning activities as described in each item of Part III are reported in Table 14. A majority of the students specified a preference for structure on four items: 23, 24, 26 and 29. Fifty percent or more of the students chose the less structured approach described in items 25, 27, and 30. In items 22, 28, and 31, responses were relatively evenly divided between the structured, less structured, and undecided choices with none representing a majority of students.

Table 14

Preference Survey-Part III: Percentage of Definite or No Preferences Regarding Structured or Less Structured Methods

Item	General Topic[1]	% Prefer Structure[2]	% Undecided[3]	% Prefer Less Structure[4]
22	self instruction	26	30	43
23	lectures	62	08	29
24	film presentation	73	03	23
25	field trips	19	24	58
26	discussion groups	72	12	16
27	study guides	26	07	67
28	readings	40	20	39
29	roleplaying	51	28	22
30	planning	31	18	50
31	questions	47	34	19

[1]see Appendix D for complete statements
[2]distractors 1 and 2
[3]distractor 3
[4]distractors 4 and 5

Comparison of Learning Style and Preference for Structured or Less Structured Methods

Additional investigation of the relationship between student response to structure and learning style was undertaken. The students' total HFT and PS-Part III scores were correlated with a follow-up analysis of the HFT scores and each PS-Part II item. Appendices N and O illustrate the distribution of scores per item and the mean scores for each HFT group, respectively, while Table 15 reports the Pearson product-moment correlation coefficient for each of the following comparisons: (1) HFT raw score and total score for the PS-Part III, (2) HFT raw score and score for each of the 10 items in Part III, and (3) HFT group and score for each of the 10 items in Part III.

Statistical comparison of PS-Part III and HFT data as shown in Table 15 reveals that little or no relationship exists between the students' learning style and preference for the structured or less structured learning activities described in PS-Part III. Therefore, the null hypothesis Ho_2 was not rejected.

Comparison of Learning Style and Course Satisfaction and Achievement

Data related to two variables incidental to this study also were analyzed to determine their relationship to fi-fd. These variables included the students' course satisfaction

Table 15

Correlation[1] of Learning Style and Preferences for Structured or Less Structured Methods

HFT	Item										
	22	23	24	25	26	27	28	29	30	31	Total
Raw Score	,12	-,06	,03	-,04	-.01	-,08	,15	-.11	-,01	,12	-.08
Group[2] Score	-.15	,08	-.06	,02	.04	,09	-,11	,06	-.05	-,14	

[1]Pearson product-moment coefficient
[2]I = categories 2, 3, and 4
II = category 5
III = category 6

and perceived achievement. An overwhelmingly positive response was given on items related to course satisfaction (PS-Part I) and students saw themselves as doing work of average or above quality (PS-Part I, item 10). Correlation of the total scores for both variables with the HFT score of the students using the Pearson product-moment technique showed a moderate but insignificant relationship between fi-fd and course satisfaction; the comparison of HFT score and perceived achievement, however, resulted in a coefficient of .268 which was significant at the .05 level with 69 degrees of freedom, indicating that the relatively fi students perceived their grades to be higher while the fd students believed theirs were lower. The students' and teachers' perceptions of individual achievement were highly related, the coefficient of .667 indicating significance at the .01 level. Data related to these findings are reported in Appendix P.

Summary

Data obtained from the self report, observation and measurement procedures were analyzed using descriptive statistics to identify the fi-fd learning style of the students and their preferences for selected conditions of instruction, and to describe the degree of structure and teacher directness-indirectness in the instructional

context. Further analysis used the Pearson product-moment correlation formula to determine the relationship between fi-fd and the instructional variables. In addition, differences between the performances of the students with relatively greater variances in scores between parts of the HFT were tested using the t-test for independent samples. With the exception of the calculation of t, all analyses were completed with the aid of a computer and appropriate programs.

The portion of the research hypothesis which predicted that the students would be predominately field dependent and that the teachers would use direct influence as a primary mode of interaction was accepted. The portion of the hypothesis which predicted that a relationship existed between fi-fd and preference for direct or indirect and structured-less structured instruction was rejected, based on the failure to reject the following null hypotheses:

Ho_1--There is no significant relationship between field independence-dependence and preference for direct or indirect instruction.

Ho_2--There is no significant relationship between field independence-dependence and preference for structured or less structured activities.

CHAPTER IV

CONCLUSIONS AND RECOMMENDATIONS

In the preceding chapters, the problem and the procedures used in the study were identified. The resultant findings were also reported. This chapter discusses the conclusions made on the basis of the findings, and also suggests further avenues of study.

Conclusions

To the extent that the data are valid and representative of child care and development students and teachers in Wisconsin VTAE diploma and associate degree programs, the following conclusions may be drawn:

1. Field dependence is the predominant learning style characterizing this student population. This may not be true when more males are enrolled in the programs. This finding is consistent with the research of Witkin (1972, 1976) which suggests that females and persons in humanistic occupations tend to be relatively field dependent. The homogeneity of this group was affirmed by Banks (1973) in his pilot study of three groups of child care students; according to his data, a concrete, versus symbolic, approach to learning was favored. Whether a relationship exists

between fi-fd and concrete-symbolic styles is unknown, but the predominance of both styles in child care students suggests extensive similarity among group members.

Even though the group is generally field dependent, a full range of this attribute exists which extends into the low and moderate ranges of fi. Therefore, factors which are as yet unknown may confound the data, particularly for those in the mid or low ranges of fi-fd. Greater variability can be expected within these groups, for the individuals may have developed alternative ways of processing information or they may possess a composite style as has been speculated by Cawley (1976) and Wapner (1976). This is substantiated by the comparison of variances in score between Parts I and II of the HFT for this group, and also by the general inconsistency of responses toward structure in learning activities by all groups.

The marked decrease in performance between the two parts of the HFT for some individuals whose total score fell in the mid-ranges of fi-fd suggests that fatigue may be a factor affecting their learning. For these persons, the pacing and initial exposure to the content and learning situation may be critical instructional variables. It may be that intruding stimuli, such as the multiplicity of lines in the figure ground of the HFT designs, have a cumulative effect which handicaps the learner as he/she

attempts to analyze each situation from a fresh perspective. In other contexts, this attribute may help the learner generalize to form desired concepts.

2. Teachers of the student subjects primarily used direct instruction during the times that class activities were observed. Use of the Flanders system for observation of the interaction between teachers and students gave a sample of strategies utilized by the teacher at a certain point in the instructional sequence. It may be that at different times of the year the ratio of direct and indirect influence would be different, depending on the teacher's assessment of the needs of the students at that time.

Since the students expressed satisfaction and were experiencing success in their classes, it may be concluded that either the teachers' instructional approaches had evolved to a point in the instructional sequence where this mode was most appropriate, or that teacher preservice education stresses the use of direct techniques and consequently they are widely used. Also, the variances which did appear suggest that a tendency toward directness or indirectness may be a natural attribute which teachers either learn or possess inherently as a result of their own learning style. Witkin's (1972, 76) studies of teachers and therapists show the influence of learning style on teaching style to be extensive. Nevertheless, the general

similarity of the instructional approaches observed suggests that (1) either the teachers are relatively homogeneous in learning style, and consequently in their approach to the content, or (2) they have adapted their approaches to match the perceived needs of the learners.

3. A slight preference by the students for indirect instruction was revealed; however, relationships between fi-fd and preference for direct or indirect instruction were not significant, except for one aspect. In this case, the personal opinion or example of the instructor was deemed by the relatively fi students to be important to their learning. This finding is inconsistent with studies (Witkin, 1972) that show development of a personal relationship to be important to the fd student. Perhaps it can be explained by noting that this teacher behavior may serve as an analytical marker or feedback mechanism whereby the fi student judges the accuracy of his/her own perceptions. In contrast, this device may cause the fd student to refocus attention toward the personality of the instructor rather than the verbalized content of the message. Fd students may see personal anecdotes, etc., primarily as a means of building the student-teacher relationship where the fi student may be better able to relate the incident to the subject matter.

The general response toward direct-indirect instruction indicates that factors other than a social, supportive climate may be influential to fd students in some situations. Particularly, it suggests that Weiss' work (1973), which found that impulsive and reflective children benefited from training geared especially toward helping them reorient their approach, might explain the choices of the fd students. Given the need to learn certain information or skills, components other than the social context may supercede this aspect in importance to the learner.

Also, it may be that the students respond to the teachers' judicious use of indirect-direct instruction according to their expections based on prior learning experiences, and as indicated by the situation, rather than to a predominance of either mode per se. The meaningfulness of the input and feedback appears to be a critical factor in this analysis. Perhaps the impact is made when meaning is derived through a congruency of the teachers' and students' perceptions about a situation or performance. Each component of indirect-direct interaction may be necessary--combined with the vital ingredient of the teacher's analysis of "how much is too much, or how little is too little." Positive and negative responses to item 21, which involved the effects of silence or confusion on learning, were quite evenly divided, indicating that this

may be an element which has a decidedly optimum range for different individuals. In general, response to items 15 and 19 showed the importance of teacher questioning to the student. Again, this may be vital to the meaningfulness of a situation, for the teacher may use this technique to diagnose, to evaluate, or to encourage, etc.

4. Students did not show general preferences for either structured or less structured learning activities. On a 40 point range, the mean hovered 1.38 points over the midpoint score of the instrument (PS-III). When correlated with HFT raw score, there was a very slight negative correlation (-.082). Distinct preferences for certain activities did emerge, however. Less structured choices were shown when more students favored independent planning and study of a problem outside of class over step-by-step self-correcting instructional packages; informal observation in communities over guided field trips; self-identification of main points in readings over teacher-made study guides; and student planning of units of study based on personal or class objectives as opposed to teacher-planned objectives and courses. In contrast, more students favored greater amounts of structure in lectures, introduction and discussion of films, small group discussions, and role-playing. Questions that asked for facts were preferred over questions that asked for opinions, although over a

third were undecided on the issue. The group was quite evenly divided in its preferences for regular assigned readings over suggested supplemental readings.

It may be concluded that generally students appear to prefer less structure in activities that relate to student choice, such as study procedures and identification of objectives, while more direction from the teacher is favored when specific learnings are involved. An exception appears to be those activities which involve little or no teacher-student interaction such as self-instruction. This finding is also supported by analysis of Banks (1973) data. The lack of consistency between item response and the low relationship to fi-fd suggest that the element of structure, in and of itself, may not differentiate an appropriate learning situation for a particular group. An unidentified factor or the synergistic effect of several factors may be more differentiating for fi-fd students than degree of structure.

5. The incidental analysis of course satisfaction and achievement showed agreement with previous work (Witkin, 1972). Course satisfaction was high, indicating that students' expectations matched the instruction planned for them. The correlation between fi and achievement suggests that instruction may be somewhat more appropriate for the more fi student than for the fd student.

6. Identification of student fi-fd through the administration of the HFT appears to be a valid, efficient, and inexpensive measure of learning style. As such, its potential value for the characterization of other student populations warrants further investigation.

7. Part II of the Preference Survey appears to have potential value in delineating the preferences of students for direct or indirect influence, particularly since it could be correlated with matrix data from class observation. Although the total scores of the students were inconclusive, the opposite might be true if the instrument were revised to specify more precisely the context of the behavior.

8. Part III of the Preference Survey showed high reliability and appeared to present clear distinctions in degree of structure for the activities listed. Comparison of each item with student performance in a simulation would test the relationship between preferences and learning outcomes, and it would also provide an opportunity to validate the instrument through analysis of the procedures inherent in each activity. It may be that structure exists to a greater or lesser degree than is apparent.

9. Finally, it must be concluded that the teacher's relationship with the student and the instructional approach are inexorably entwined. For some students, however, it appears that the extent to which either aspect takes

precedence at any given time may have an important effect on learning. The relationships among the approach, the situation, and student learning style have not yet been identified.

Recommendations

This study suggests that additional investigation related to learning/teaching styles is warranted in order to further delineate the characteristics of specific populations and to determine the relationship of these factors to the interaction process and learning outcomes. Students participating in this study will eventually be responsible for the care and development of young children. The effectiveness of the learning situation for both fi and fd children will depend on the teacher's ability to diagnose, plan, and implement a curriculum that will provide maximum opportunities for learning. If the teacher's learning style affects the total learning environment, some children will receive more appropriate instruction than others unless a deliberate effort is made to accommodate their approach to learning. By continued study, these features of instruction might be identified. Specifically, the following questions pertinent to the issue have been raised:

1. What are the fi-fd characteristics of child care and development or early childhood education students enrolled in university programs? preschool and/or kindergarten teachers? teacher-educators of the above groups?

2. What are the fi-fd characteristics of preschool children? What measures could be developed to ascertain these qualities for a large scale study?

3. How does a learner with a particular degree of fi-fd teach?

4. In what situations are fi or fd learners more successful? In what situations are fi or fd teachers more successful?

5. Does a relationship exist between birth order or size of family grouping and fi-fd?

6. Does a relationship exist between socioeconomic factors or place of residence and fi-fd?

7. What factors account for the greater variance in performance on parts of the HFT for low and moderately fi learners?

8. Are learning outcomes of fi-fd students consistent with their preferences for direct or indirect instruction and structured or less structured activities?

9. What factors influence a teacher's transition from direct to indirect influence and vice versa?

REFERENCES

Arbuthnot, Jack, & Gruenfeld, Leopold. Field independence and educational-vocational interests. Journal of Consulting and Clinical Psychology, 1969, 33, 631.

Banks, John C. An investigation of the interaction of learning styles and types of learning experiences in vocational-technical education. Menomonie, Wisconsin: Center for Vocational, Technical and Adult Education, University of Wisconsin-Stout, June, 1973.

Beard, Ruth M. Piaget's developmental psychology. New York: Basic Books, Inc., 1969.

Buros, Oscar Kriesen (Ed.). The eighth mental measurements yearbook. Highland Park, New Jersey: The Gryphon Press, 1972.

Butler, Annie. Current research in early childhood education. Washington, D.C.: NEA Center, 1970.

Cawley, Richard W.W., Miller, Sheila A., & Milligan, James N. Cognitive styles and the adult learner. Adult Education, 1976, 26, 101-116.

Davis J.Kent. Concept identification as a function of cognitive style, complexity, and training procedures (Technical Report No. 32). Madison, Wisconsin: Wisconsin Research and Development Center for Cognitive Learning, University of Wisconsin, October, 1967.

Doyal, Guy T., & Forsyth, Robert A. The effect of test anxiety, intelligence and sex on children's problem solving ability. Journal of Experimental Education, 1972, 41, 23-26.

Dyk, Ruth B., & Witkin, Herman A. Family experiences related to the development of differentiation in children. Child Development, 1965, 36, 21-54.

Ekstrom, Ruth B., French, John W., Harman, Harry H., & Dermen, Diran. Manual for kit of factor-referenced cognitive tests. Princeton, New Jersey: Educational Testing Service, 1976.

Elliott, Charles A. The effects of instructional designs matched to individual differences in cognitive style on concept learning: a trait-treatment interaction study. Paper presented at the annual meeting of the American Educational Research Association, San Francisco, CA., April, 1976.

Flanders, Ned A. Interaction analysis in the classroom. Ann Arbor, Michigan: School of Education, The University of Michigan, 1964.

Forer, Ruth, Miller, James, and Fuller, Williamson. Cognitive correlates of learning problems: some implications for early identification and intervention. Paper presented at the biennial meeting of the Society for Research in Child Development, Denver, CO., April 10-13, 1975.

Frederick, Wayne C., Information processing and concept learning at grades 6, 8 and 10 as a function of cognitive style (Technical Report No. 44). Madison, Wisconsin: Wisconsin Research and Development Center for Cognitive Learning, University of Wisconsin, March, 1968.

French, John W., Ekstrom, Ruth B., & Price, Leighton A. Manual for kit of reference tests for cognitive factors. Princeton, New Jersey: Educational Testing Service, 1963.

Fried, Helen Cecile. Achievement of cognitive skills in Head Start as related to certain home environment factors. Unpublished doctoral dissertation, University of Southern California, 1973 (Dissertation Abstracts International, 3831A).

Gibb, Jack R. Defensive communication. In Melvin L. Silberman, Jerome S. Allender, & Jay M. Yanoff (Eds.), Real learning. Boston: Little, Brown and Company, 1976.

Gibson, Eleanor J. Development of perception: discrimination of depth compared with discrimination of graphic symbols. In Society for Research and Development' Cognitive development in children. Chicago: University of Chicago Press, 1970.

Gray, Jerry L. & Knief, Lotus M. The relationship between cognitive style and school achievement. Journal of Experimental Education, 1975, 43, 67-71.

Ingram, Jerry. A study of the correlation between selected instructional methods and individual learning styles measured on a concrete/symbolic continuum. Unpublished Master's thesis, University of Wisconsin-Stout, 1974.

Kagan, Jerome, Moss, Howard A., & Sigel, Irving E. Psychological significance of styles of conceptualization. In Society for Research in Child Development' Cognitive development in children. Chicago: University of Chicago Press, 1970.

Kogan, Nathan. Educational implications of cognitive styles. In Gerald S. Lesser (Ed.), Psychology and Educational Practice. Glenview, IL.: Scott-Foresman and Company, 1972.

Lovell, K. An introduction to human development. David Elkind (Ed.). Glenview, IL.: Scott-Foresman and Company, 1971.

Lucas, John A. Learning efficiency of students in varying environments. Journal of Experimental Education, 1970, 39, 63-68.

Mayer, Richard E. Learning to solve problems: role of instructional methods and learner activity. Ann Arbor, MI.: Human Performance Center, University of Michigan, 1974. (ERIC Document Reproduction Service No. ED 091 225)

Messick, Samuel. The criterion problem in the evaluation of instruction: assessing possible, not just intended, outcomes. In Len Sperry (Ed.), Learning performance and individual differences. Glenview, IL.: Scott-Foresman and Company, 1972.

Messick, Samuel & Associates. Individuality in learning, San Francisco, CA.: Jossey-Bass Publishers, 1976.

Morss, Robert M. Statistical computer programs guide. Menomonie, Wisconsin: Center for Vocational, Technical and Adult Education, University of Wisconsin-Stout, 1976.

Neidt, Charles O. & Hedlund, Dalva E. Longitudinal relationships between cognitive and affective learning outcomes. The Journal of Experimental Education, 1969, 37, 56-61.

Ober, Richard L. The reciprocal category system. Journal of Research and Development in Education, 1970, 4, 34-51.

Ogunyemi, E. 'Loure. Cognitive styles and student science achievement in Nigeria. Journal of Educational Research, 1973, 42, 57-63.

Satterley, David. Cognitive styles, spatial ability and school achievement. Journal of Educational Psychology, 1976, 68, 36-42.

Shumsky, Adaia. Individual differences in learning styles. In Len Sperry (Ed.), Learning performance and individual differences. Glenview, IL.: Scott-Foresman and Company, 1972.

Smart, Mollie S. & Smart, Russell C. Children, Second Edition. New York: Macmillan Publishing Company, Inc., 1972.

Sperry, Len (Ed.). Learning performance and individual differences. Glenview, IL.: Scott-Foresman and Company, 1972.

Taylor, Terry D., Chow, Stanley H.L., Hubner, Judith J., & Stripp, Steven P. Measurement of classroom versus written exam teacher performance: should teachers show or tell? San Francisco, CA.: Far West Laboratory for Educational Research and Development, 1976.

Vernon, P.E., The distinctiveness of field independence. Journal of Personality, 1972, 40, 366-391.

Victor, James B. Peer judgments of teaching competence as a function of field independence and dogmatism. Journal of Experimental Education, 1976, 44, 10-13.

Walker, Helen M. & Lev, Joseph. Elementary statistical methods. New York: Holt, Rinehart and Winston, Inc., 1969.

Wapner, Seymour. Process and context in the conception of cognitive style. In Samuel Messick & Associates, Individuality in learning. San Francisco: Jossey Bass Publishers, 1976.

Wasik, Barbara H. and Wasik, John L. Response strategies of culturally deprived children. Journal of Experimental Education, 1972, 40, 84-90.

Webb, Jeaninne Nelson. Taxonomy of cognitive behavior. Journal for Research and Development in Education, 1970, 4, 23-33.

Weiss, Beverly J. Phillips. Cognitive styles and susceptibility to alternate forms of conservation training in kindergarten children. Unpublished doctoral dissertation, Boston University, 1973 (Dissertation Abstracts International, 1736B).

Weissenberg, Peter. Concurrent validity of the Hidden Figures Test (CF-1). Perceptual and Motor Skills, 1973, 36, 460-462.

Witkin, Herman A. The role of cognitive style in academic performance and in teacher-student relations. Paper presented at the symposium on "Cognitive Style, Creativity, and Higher Education", Montreal, Canada, November 8-10, 1972.

Witkin, Herman A. Field dependence-independence psychological differentiation: a bibliography with index. Princeton, New Jersey: Educational Testing Service, 1973a.

Witkin, Herman A. Discussion. In John C. Wright and Jerome Kagan (Eds.), Basic cognitive processes in children. Chicago: University of Chicago Press, 1973b.

Witkin, Herman A., Goddenough, Donald R., & Karp, Steven A. Stability of cognitive style from childhood to young adulthood. In Len Sperry (Ed.), Learning performance and individual differences. Glenview, IL.: Scott-Foresman and Company, 1972.

Witkin, H.A., Moore, C.A., Goodenough, D.R. & Cox, P.W. Field-dependent and field-independent cognitive styles and their educational implications. Review of Educational Research, 1977, 47, 1-64.

Yando, Regina M. & Kagan, Jerome. The effect of teacher tempo on the child. Child Development, 1968, 39, 27-34.

APPENDICES

APPENDIX A

Availability of the Hidden Figures Test

1. The Hidden Figures Test, Cf-1 is copyrighted (1962) by the Educational Testing Service. All rights are reserved, and it may be reproduced only under license.

2. Information regarding the purchase, reproduction, or use of the Hidden Figures Test may be obtained from the following address:

   Educational Testing Service
   Princeton, New Jersey 08540

APPENDIX B

Summary of Categories for Interaction Analysis*

Indirect Influence: Teacher Talk

1. Accepts feeling: accepts and clarifies the feeling tone of the students in a nonthreatening manner. Feelings may be positive or negative. Predicting and recalling feelings are included.
2. Praises or encourages: praises or encourages student action or behavior. Jokes that release tension, not at the expense of another individual, nodding head or saying "uh huh?" or "go on" are included.
3. Accepts or uses ideas of student: clarifying, building, or developing ideas or suggestions by a student. As teacher brings more of his own ideas into play, shift to category five.
4. Asks questions: asking a question about content or procedure with the intent that a student answer.

Direct Influence: Teacher Talk

5. Lectures: giving facts or opinions about content or procedure; expressing his own idea; asking rhetorical questions.
6. Gives direction: directions, commands, or orders with which a student is expected to comply.
7. Criticizes or justifies authority: statements, intended to change student behavior from non-acceptable to acceptable pattern; bawling someone out; stating why the teacher is doing what he is doing, extreme self reference.

Student Talk:

8. Student talk-response: talk by students in response to teacher. Teacher initiates the contact or solicits student statement.

9. Student talk-initiation: talk by students, which they initiate. If "calling on" student is only to indicate who may talk next, observer must decide whether student wanted to talk. If he did, use this category.

Silence or Confusion:

10. pauses, short periods of silence, and periods of confusion in which communication cannot be understood by the observer.

Sample Matrix

Category	1	2	3	4	5	6	7	8	9	10	Total
1				1							1
2											0
3											0
4								1		1	2
5	1										1
6										1	1
7					1						1
8				1							1
9											0
10						1	1				2
Total	1	0	0	2	1	1	1	1	0	2	9

*Flanders, 1964, p. 5.

APPENDIX C

Intra-Observer Reliability Using Percent of Agreement
Between Taped and Original 20 Minute Sample

Group	% in Category 1	2	3	4	5	6	7	8	9	10	% All Categories
1	100	50	71	63	99	100	100	71	61	88	80
2	100	50	100	75	89	96	100	99	80	51	84
3	100	50	27	45	90	100	100	76	97	85	77
4	100	89	81	79	92	80	100	79	61	90	85
5	100	67	50	67	90	100	100	90	87	89	84
Total											82

APPENDIX D

PREFERENCE SURVEY: VOCATIONAL CHILD CARE STUDENTS

School _____ Date _____

Instructor _____ Course _____

Name _____ Program _____

Address _____ Telephone _____

Please check the answer that applies to you.

1. My age is
   _____ (1) 18-20
   _____ (2) 21-25
   _____ (3) 26-30
   _____ (4) 31-35
   _____ (5) 36-over

2. I am
   _____ (1) male
   _____ (2) female

3. I grew up in a
   _____ (1) rural area
   _____ (2) village or city under 10,000 population
   _____ (3) city between 10,000 and 39,000 population
   _____ (4) city between 39.000 and 150,000 population
   _____ (5) city over 150,000 population

4. My parents have had _____ child (children).
   _____ (1) 1
   _____ (2) 2-3
   _____ (3) 4-5
   _____ (4) 6-7
   _____ (5) 8 or more (specify number here _____)

5. I am the _____ child in my family.
   _____ (1) first
   _____ (2) second
   _____ (3) third
   _____ (4) fourth
   _____ (5) other (specify position here _____)

The following statements will give you a chance to express your feelings about teaching methods in order to identify those which are most suitable for you. Please consider each statement carefully and check the answer that best represents your feelings. Your answers will be confidential.

Part I:

6. This course is interesting to me.
   _____ (1) strongly disagree
   _____ (2) disagree
   _____ (3) undecided
   _____ (4) agree
   _____ (5) strongly agree

7. I am learning many new things in this course.
   _____ (1) strongly disagree
   _____ (2) disagree
   _____ (3) undecided
   _____ (4) agree
   _____ (5) strongly agree

8. The material in this course will be helpful to me when I am working with young children.
   _____ (1) strongly disagree
   _____ (2) disagree
   _____ (3) undecided
   _____ (4) agree
   _____ (5) strongly agree

9. I would recommend this course to a friend who is interested in working with young children.
   _____ (1) strongly disagree
   _____ (2) disagree
   _____ (3) undecided
   _____ (4) agree
   _____ (5) strongly agree

10. I think that my performance at this point in the course has been
   _____ (1) excellent (most of my grades have been A's)
   _____ (2) above average (most of my grades have been B's)
   _____ (3) average (most of my grades have been C's)
   _____ (4) below average (most of my grades have been D's)
   _____ (5) failing (most of my grades have been F's)

Part II:

11. It is important to my learning that the instructor understands and accepts my feelings.
_____ (1) strongly disagree
_____ (2) disagree
_____ (3) undecided
_____ (4) agree
_____ (5) strongly agree

12. It is important to my learning to be praised and encouraged by the instructor when I do things well.
_____ (1) strongly disagree
_____ (2) disagree
_____ (3) undecided
_____ (4) agree
_____ (5) strongly agree

13. It is important to my learning to be criticized when I do things poorly.
_____ (1) strongly disagree
_____ (2) disagree
_____ (3) undecided
_____ (4) agree
_____ (5) strongly agree

14. It is important to my learning that the instructor repeats my comments, and then uses them to ask questions or give examples.
_____ (1) strongly disagree
_____ (2) disagree
_____ (3) undecided
_____ (4) agree
_____ (5) strongly agree

15. It interferes with my learning when the instructor asks me questions in front of the class.
_____ (1) strongly disagree
_____ (2) disagree
_____ (3) undecided
_____ (4) agree
_____ (5) strongly agree

16. It is important to my learning that the instructor give his or her personal opinion or personal example when lecturing.
_____ (1) strongly disagree
_____ (2) disagree
_____ (3) undecided
_____ (4) agree
_____ (5) strongly agree

17. It is important to my learning that I be allowed to study in my own way, rather than having the instructor tell me exactly what to do.
_____ (1) strongly disagree
_____ (2) disagree
_____ (3) undecided
_____ (4) agree
_____ (5) strongly agree

18. It affects my learning when the instructor criticizes me in class.
_____ (1) strongly disagree
_____ (2) disagree
_____ (3) undecided
_____ (4) agree
_____ (5) strongly agree

19. It bothers me to have the instructor ask me questions in class, even if I know the answer.
_____ (1) strongly disagree
_____ (2) disagree
_____ (3) undecided
_____ (4) agree
_____ (5) strongly agree

20. I feel comfortable asking questions in class.
_____ (1) strongly disagree
_____ (2) disagree
_____ (3) undecided
_____ (4) agree
_____ (5) strongly agree

21. Periods of silence or confused communication during class don't bother me.
_____ (1) strongly disagree
_____ (2) disagree
_____ (3) undecided
_____ (4) agree
_____ (5) strongly agree

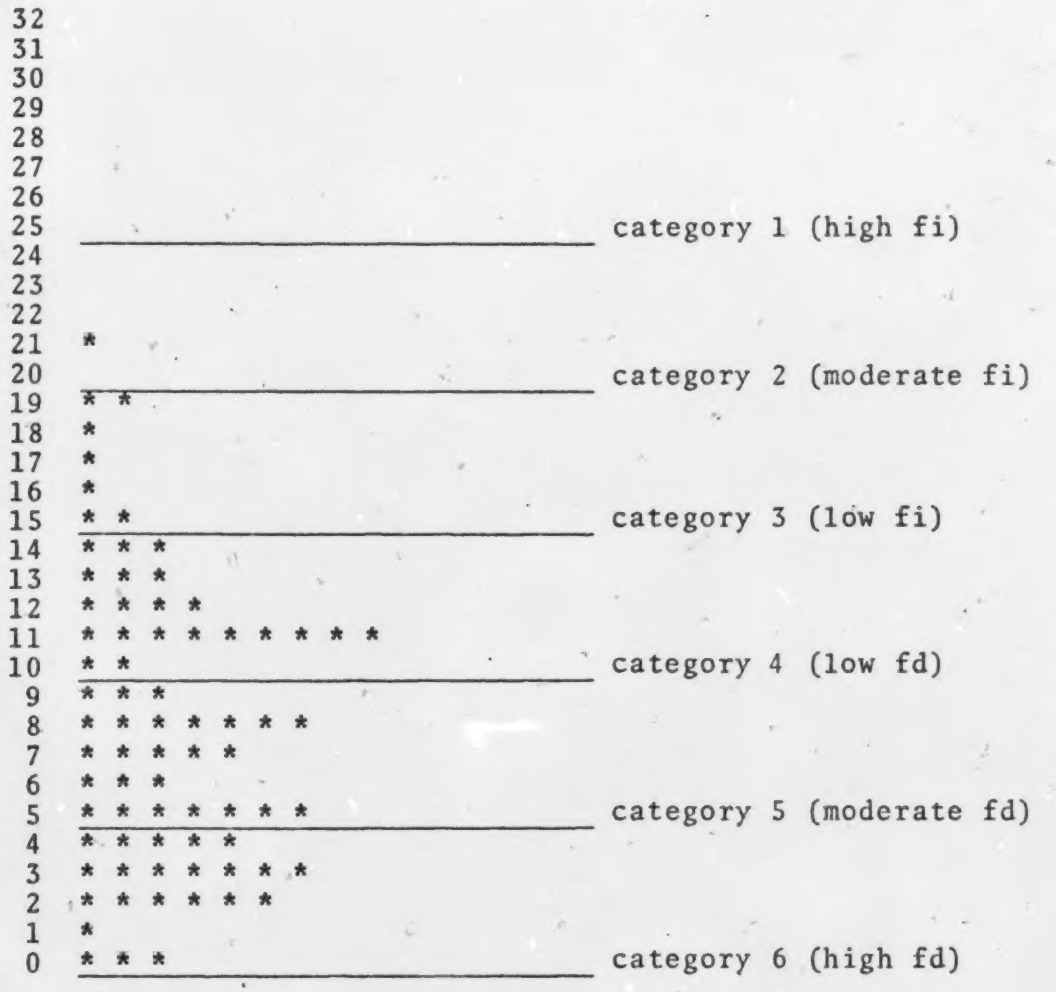
Part III: Each question listed below describes two teaching methods. Read the descriptions for each pair and select the one method which best helps you learn. Indicate your choice by placing a check (✓) in the space nearest the method you select if your feelings are definite. If your feelings are less definite, check the next nearest space. If you are undecided, check the middle space.

		Definite		Undecided		Definite	
22.	Instructional packages where you follow step-by-step instructions, check your answers, and proceed at your own pace	____	____	____	____	____	Independent planning and study of a problem instead of attending regular classes
23.	Lectures where the teacher outlines the main points and students are expected to take notes	____	____	____	____	____	Lectures where the teacher informally discusses a topic, then asks or answers questions
24.	Detailed introduction of films, followed by a discussion led by the teacher after viewing	____	____	____	____	____	General introduction of films, with an opportunity to ask questions of the teacher after viewing
25.	Guided field trips to a site in the community	____	____	____	____	____	Informal observation in the community
26.	Small group discussions where the topic is assigned, a time limit is given, and a leader is chosen by the teacher	____	____	____	____	____	Small group discussions where the group selects a topic and leader, and there is no time limit
27.	Use of teacher-made study guides	____	____	____	____	____	Identifying important points in the readings by yourself

		Definite		Undecided		Definite	
28.	Regular, assigned readings directly related to coursework	____	____	____	____	____	Suggested readings you might find helpful
29.	Roleplaying in which the situation and action are outlined by the teacher	____	____	____	____	____	Roleplaying in which the student selects the situation and develops the action
30.	Teacher-planned course objectives, content, assignments, schedule and grading procedures; presented at the beginning of the course	____	____	____	____	____	Student-planned units of study based on objectives of the person or the class; developed as the course progresses
31.	Questions that ask for facts	____	____	____	____	____	Questions that ask for opinion

APPENDIX E

Hidden Figures Test: Distribution of Scores



APPENDIX F

Status of Each Class of Students on the HFT

Descriptor	Classes A	B	C	D	E	Total
N	17	15	12	11	21	76
Mean						
Part I	4.53	2.87	3.67	5.09	3.43	3.84
Part II	4.71	4.40	3.33	5.09	3.76	4.22
Total HFT	9.24	7.27	7.00	10.18	7.19	8.07
SD						
Part I	3.37	2.20	2.64	2.34	2.68	2.75
Part II	3.02	3.02	2.71	2.91	3.28	3.01
Total HFT	5.43	4.57	4.20	4.49	5.54	5.01
SE						
Part I	1.46	1.39	1.49	1.36	1.39	1.48
Part II	1.52	1.57	1.33	1.47	1.37	1.49
Total HFT	2.16	2.11	2.06	2.03	1.94	2.13
R*						
Part I	.81	.65	.72	.60	.74	.75
Part II	.75	.75	.73	.71	.81	.78
Total HFT	.82	.78	.73	.73	.86	.82

*Spearman-Brown formula

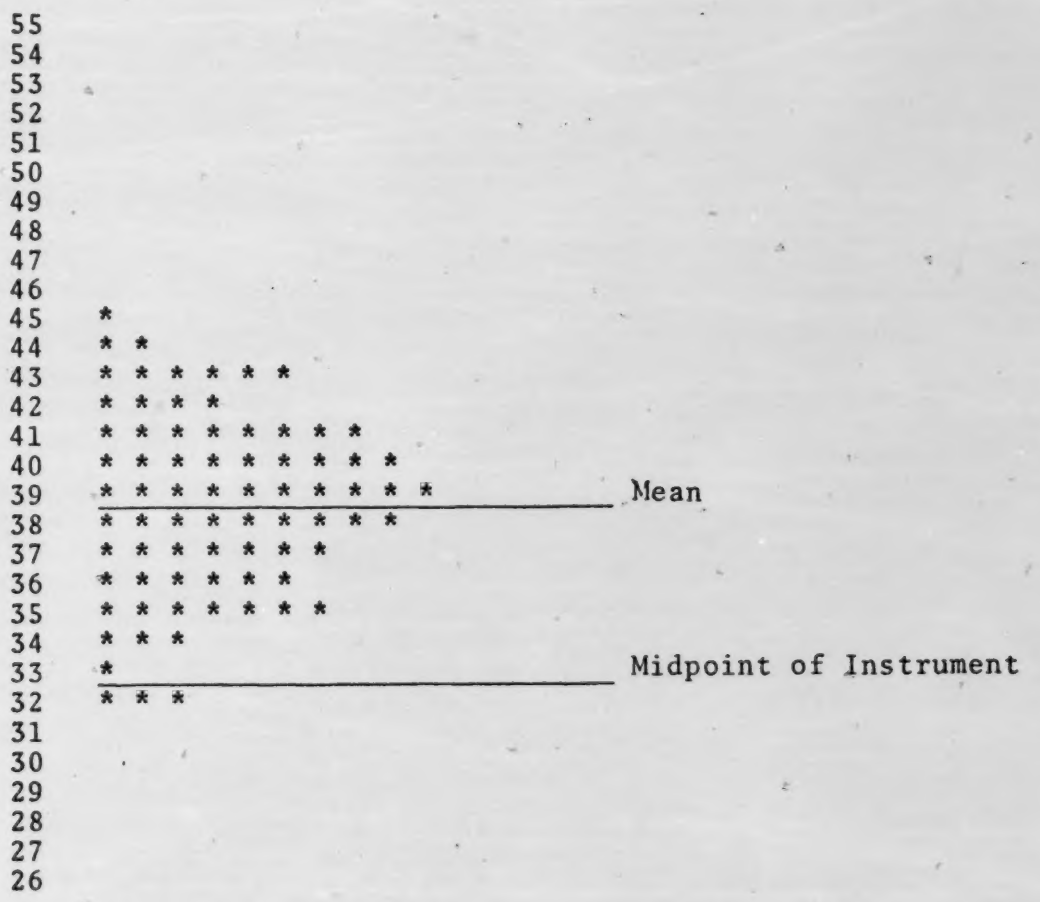
APPENDIX G

Number of Interactions in Matrix Columns in 90 Minutes of Selected Instruction

	Category									
Class	1	2	3	4	5	6	7	8	9	10
A	0	36	57	105	909	40	0	195	87	352
B	2	22	58	85	966	60	0	413	63	132
C	0	3	44	42	1211	0	0	127	202	172
D	1	43	85	108	787	74	5	256	118	324
E	7	21	38	53	640	62	1	674	239	66
Total	10	125	282	393	4513	236	6	1665	709	1046
% of Total	001	01	03	04	50	03	001	19	08	12

APPENDIX H

Preference Survey-Part II: Distribution of Scores



APPENDIX I

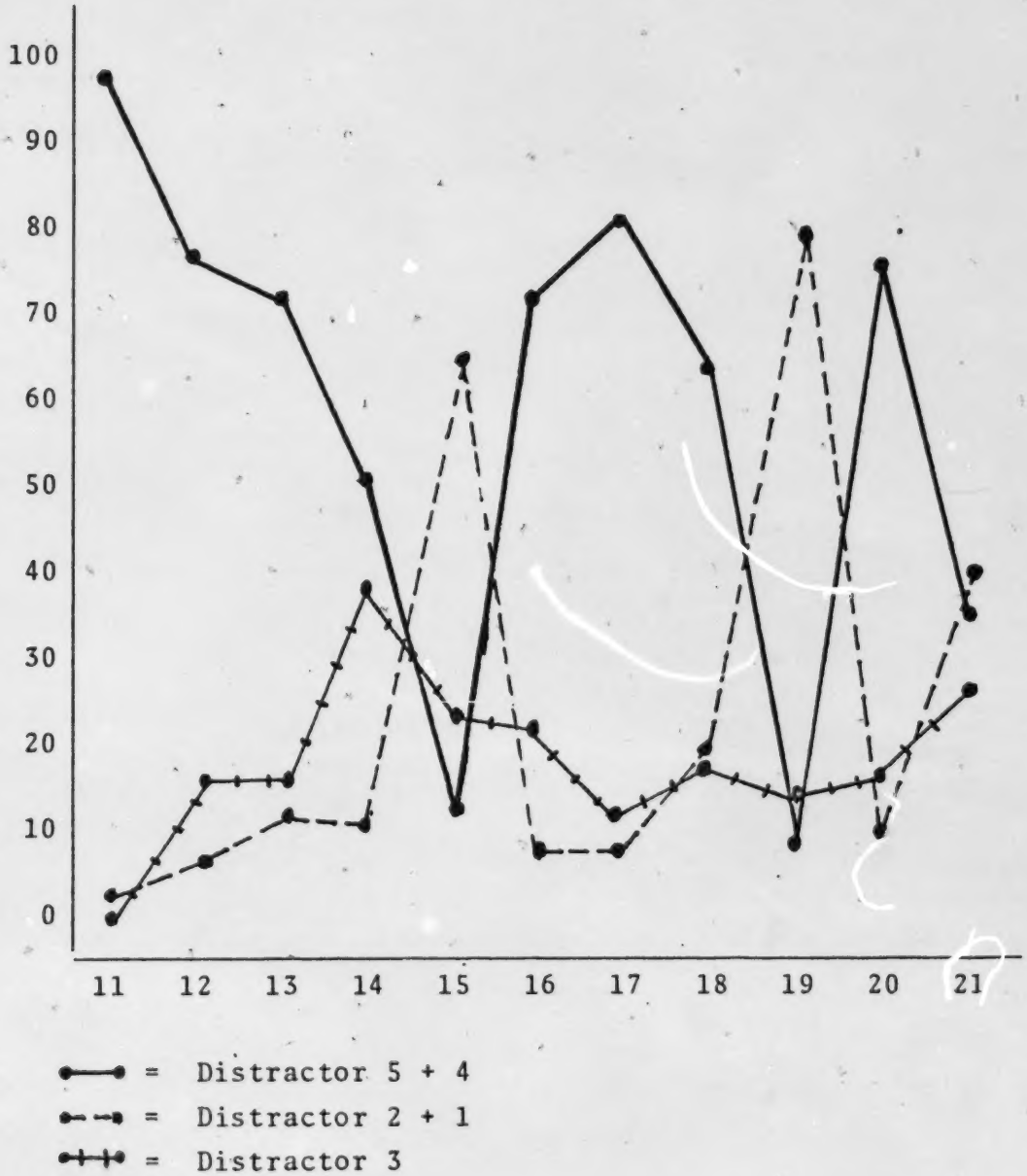
Preference Survey-Part II: Response of Each Class Toward Teacher Directness-Indirectness

Descriptor	Class A	B	C	D	E	Total
N	17	15	12	11	21	76
Mean Score	38.7	39.0	38.8	38.3	38.1	38.6
Standard Deviation	2.71	3.25	3.72	3.10	3.02	3.07
Average Response	3.52	3.55	3.52	3.48	3.47	3.50
Composite Mean	3.52	3.55	3.52	3.48	3.48	3.51
Composite SD	1.11	1.11	1.25	1.28	1.08	1.15
Reliability*	.52	.59	.66	.49	.55	.55

*Spearman-Brown formula

APPENDIX J

Preference Survey-Part II: Distribution of Responses for Each Item



APPENDIX K

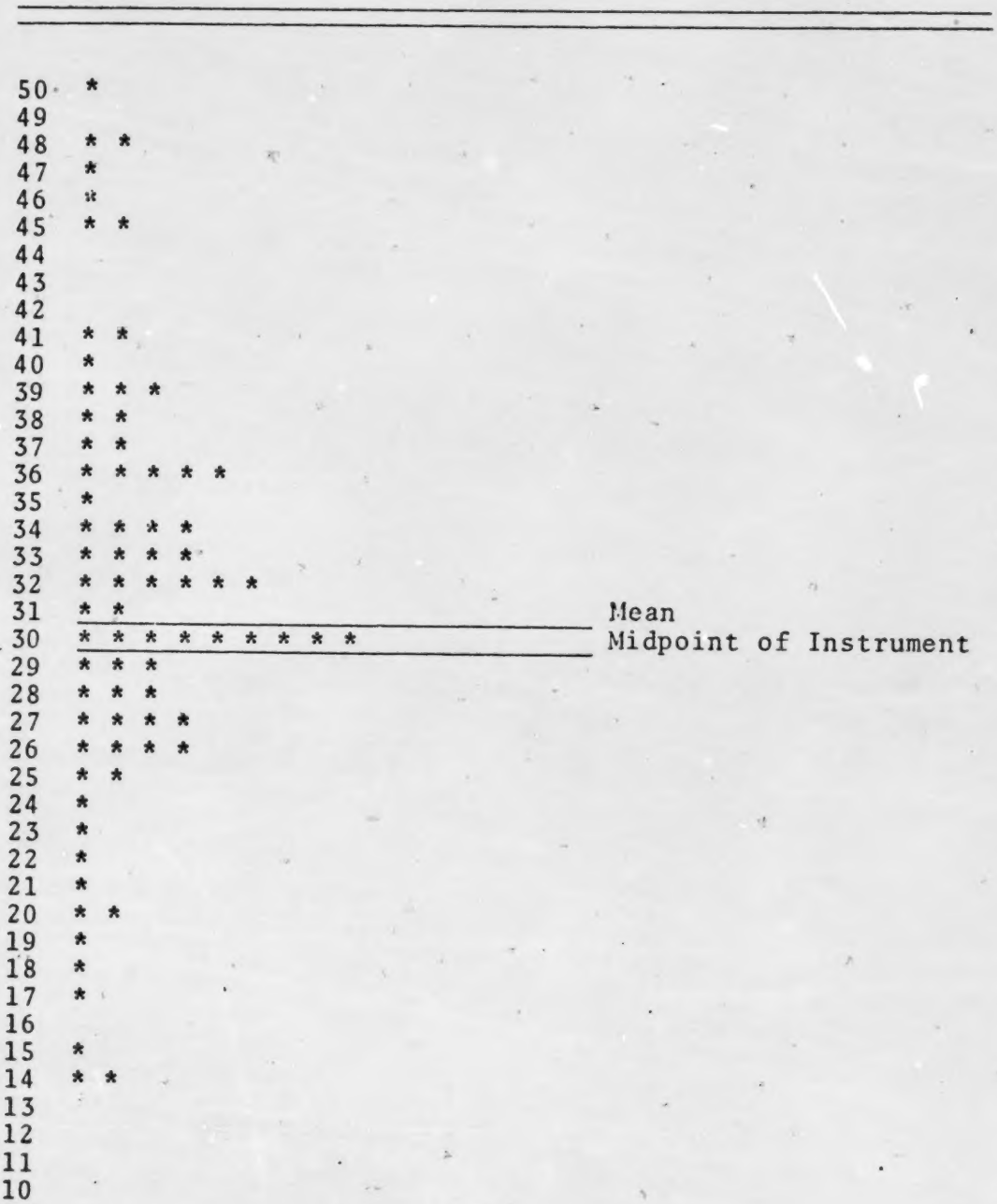
Means and Standard Deviations of the HFT Groups* on each Item of PS-Part II

Item	Means				Standard Deviation			
	I	II	III	Total	I	II	III	Total
11	4.59	4.68	4.50	4.59	0.82	0.48	0.74	0.74
12	4.10	4.08	3.82	4.01	0.82	0.81	0.85	0.82
13	3.76	3.52	4.05	3.76	1.02	1.05	0.65	0.95
14	3.41	3.68	3.36	3.49	0.87	0.69	0.58	0.74
15	2.10	2.44	2.41	2.30	0.90	0.96	0.91	0.92
16	4.38	3.72	3.59	3.93	0.73	1.02	0.96	0.96
17	4.00	4.08	4.09	4.05	0.89	0.76	0.87	0.83
18	3.62	3.68	3.64	3.64	0.98	1.11	1.09	1.04
19	1.86	2.20	2.27	2.09	0.74	0.76	0.88	0.80
20	3.86	3.96	3.68	3.84	1.13	0.68	0.84	0.91
21	2.93	2.88	2.95	2.92	1.03	0.93	1.05	0.99

*I = categories 2, 3, and 4; N = 29
II = category 5; N = 25
III = category 6; N = 22

APPENDIX L

Preference Survey-Part III: Distribution of Scores



APPENDIX M

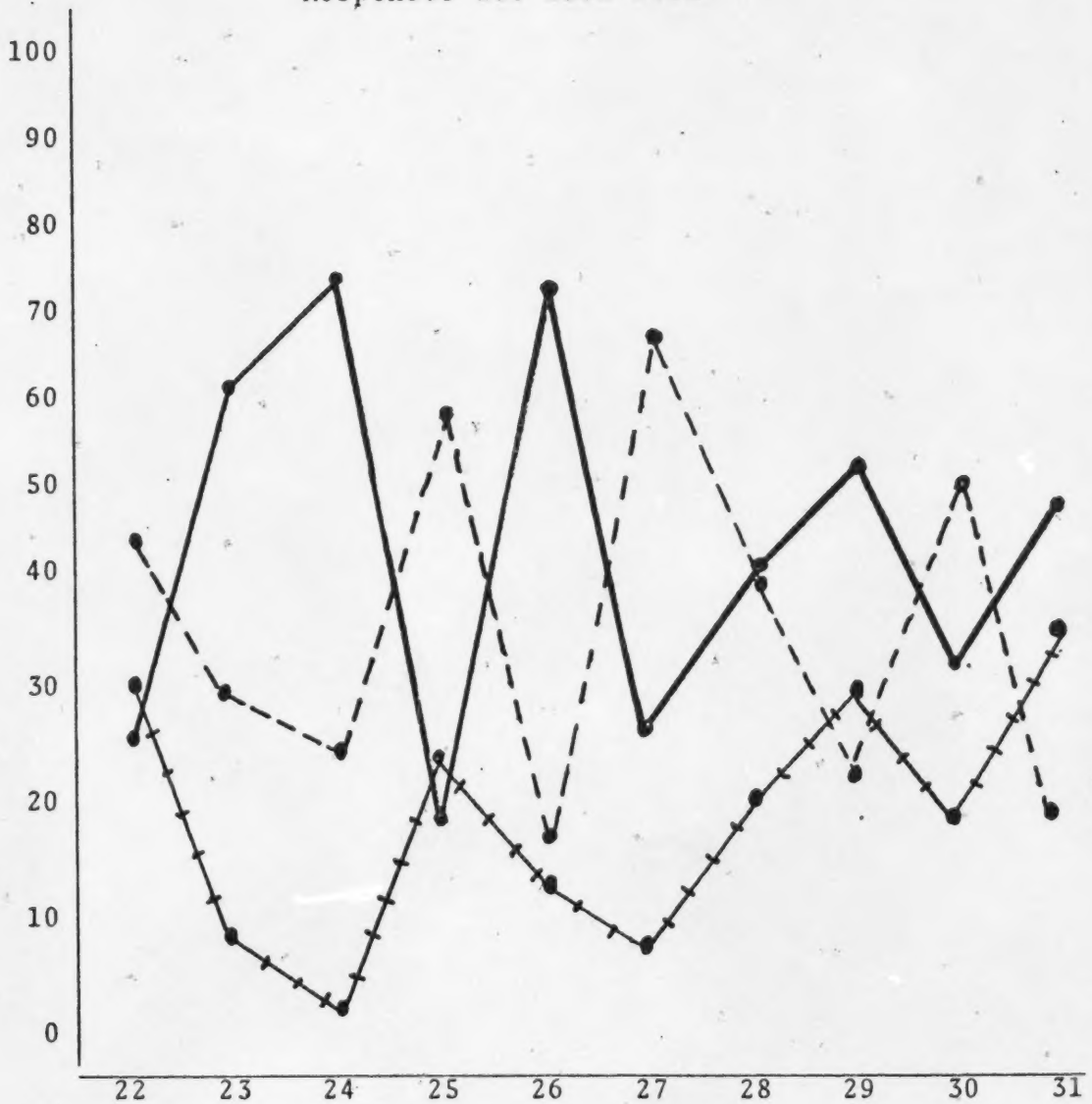
Preference Survey-Part III: Response of Each Class Toward Structured or Less Structured Methods

Descriptor	Class A	B	C	D	E	Total
N	17	15	12	11	21	76
Mean score	33.9	27.4	35.3	30.6	30.3	31.4
Standard Deviation	8.32	5.77	7.08	5.90	9.41	8.00
Average Response	3.39	2.74	3.53	3.06	3.03	3.14
Composite Mean	3.39	2.78	3.53	3.06	3.05	3.15
Composite SD	1.48	1.51	1.51	1.56	1.60	1.55
Reliability*	.86	.66	.76	.72	.87	.82

*Spearman-Brown formula

APPENDIX N

Preference Survey-Part III: Distribution of Responses for Each Item



APPENDIX O

Means and Standard Deviations of the HFT Groups* on Each Item of PS-Part III

Item (See Appendix D)	Means				Standard Deviation			
	I	II	III	Total	I	II	III	Total
22	3.45	3.20	3.00	3.24	0.95	1.26	1.48	1.22
23	2.21	2.48	2.50	2.38	1.57	1.64	1.77	1.63
24	2.21	2.00	2.00	2.08	1.50	1.44	1.63	1.50
25	3.52	4.08	3.55	3.71	1.30	1.19	1.50	1.33
26	1.86	1.92	2.00	1.92	1.22	1.29	1.41	1.28
27	3.21	4.20	3.45	3.61	1.45	1.15	1.74	1.50
28	3.17	2.88	2.77	2.96	1.58	1.54	1.63	1.57
29	2.41	2.60	2.59	2.53	1.38	1.29	1.50	1.37
30	3.52	3.56	3.32	3.47	1.33	1.50	1.73	1.49
31	2.76	2.28	2.32	2.47	1.43	1.34	1.21	1.34

*I = categories 2, 3, and 4; N = 29
II = category 5; N = 25
III = category 6; N = 22

APPENDIX P

Analysis of Course Satisfaction and Perceived Achievement of Students in Comparison with HFT Score

Variable	Mean Score[1]	SD	Av. response[2]	correlation with HFT score	correlation with teacher
Course Satisfaction*	17.84	2.05	4.46	.202	
Perceived Achievement**	4.00	.97	4.00	.268+	.667++

[1]range = 4-20
[2]range = 1-5
*Spearman-Brown reliability = .86
**Spearman-Brown reliability - 1.00
+significant at the .05 level
++significant at the .01 level

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